A Workplace Initiative to Promote Physical Activity

A thesis submitted in partial fulfilment

of the requirements for the Degree

of Master of Health Sciences

in the University of Canterbury

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University of Canterbury

2011

DEDICATION

I dedicate this thesis to my parents, Brian and Elenore and brothers, Brendon and Michael and sisters, Patricia and Jacinta for the understanding and encouragement they provided during all these years of study. I love you all.

"My grace is sufficient for you, for my power is made perfect in weakness." 2 Corinthians 12:9

ACKNOWLEDGEMENTS

The thesis is the end of my long journey in obtaining my degree in Health Sciences. The journey has been a challenging and rewarding experience which has deeply enriched me as a person.

Foremost, I would like to express my sincere appreciation to my primary supervisor, Assoc. Prof. Ray Kirk for his support, encouragement and guidance throughout this year. For this guidance and advice, I am deeply grateful. I would also like to thank my co-supervisor Prof. Andrew Hornblow for his patience, motivation, enthusiasm, and immense knowledge and kind guidance during this study. I could not have imagined having better advisors and mentors for my Masters study.

My sincere thanks also go to Dr. Arindam Basu and Pat Coope for their input and support with the statistical analysis. Thanks to the staff at the Department of Health Sciences, the library and Sport Canterbury for the resources and support for conducting this study.

I would also like to gratefully acknowledge the support from my colleagues especially David Brinson and Franziska Gallrach. They helped me immensely by giving me encouragement, advice and friendship.

Finally, I wish to acknowledge my family and friends for their continued support and encouragement, for which I am extremely grateful.

ABSTRACT

Advances in workplace based physical activity programmes have been observed worldwide, however, minimal research has been carried out on workplace based programmes in New Zealand. Physical activity is an important modifiable risk factor for conditions such as CVD, diabetes mellitus, and obesity. Physical inactivity is a significant risk factor, approximately half of New Zealand adults are recorded as physically inactive. Promoting health in the workplace increases the chances of health and well-being. Studies on workplaces that incorporate health and wellness initiatives including physical activity programmes, demonstrate lower health care costs and absenteeism and an overall improvement in physical and mental health, job performance, motivation and productivity.

This study examined the self-reported physical activity outcomes obtained by a sub group of individuals who participated in the 2007 Sea 2 Sea Challenge, and the extent of support provided by their workplace. The Sea 2 Sea Challenge is a six-week workplace physical activity initiative run annually in Christchurch, by Sport Canterbury, which is now in its seventh year.

This study is based on data gathered during and after the Sea 2 Sea Challenge. Both individual and workplace data were obtained on participation in, and impact of, the programme. A self-report physical activity chart was filled out by individual participants in the programme. Online and paper questionnaires were also sent to each workplace and filled out by the workplace coordinator, including information on workplace support. Over the study period 3,732 individuals from 114 workplaces participated in the Sea 2 Sea Challenge. Of the 3,732 total participants, 688 (18.4%) participants filled out and returned the self-report physical activity cards and 54 out of 114 (47.4%) workplace coordinators completed the online/paper questionnaire. These data were subsequently analysed using SPSS software and issues examined include factors associated with levels of individual and workplace participation and the extent to which workplaces supported the Sea 2 Sea programme.

Some key findings include: The Sea 2 Sea Challenge has maintained a steady increase in the number of workplaces taking part each year since 2004. From 2005 to 2007, there was approximately a 30% increase in workplaces participating each year. Of the participants who completed the physical activity self-report chart, 70% met the recommended level of activity of 30 minutes each day over six weeks, despite the often low levels of support provided by the workplace and/or workplace

coordinator. Although the programme is only short term, the Sea 2 Sea Challenge demonstrates the potential of the programme as a successful workplace intervention in the Canterbury region, particularly for a sub-group of people that reported high levels of physical activity. From the perspective of health promotion targeted to the working population this is a significant and low cost short term outcome for a substantial group. However, the long-term effects of the intervention are not known.

The study affirms the potential value of the workplace as a useful setting for health promotion and has also indicated the need for a more extensive evaluation of the effectiveness of such a workplace based health promotion programme. The strengths and the limitations of this study are discussed along with implications for successful implementation of workplace based physical activity programmes in general.

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GLOSSARY OF TERMS

All cause mortality (ACM): the mortality rate from a specified cause for a population. For example, the crude death rate is the total number of deaths relative to the total population (usually expressed per 1,000). All-cause mortality by age group is the annual number of deaths in a given age group per the population in that age group (usually expressed per 100,000 (Wikipedia, 2010).

Baseline activity: the light-intensity activities participants' undertake in daily life, such as walking slowly, and lifting lightweight objects (World Health Organisation, 2010).

Body Mass Index (BMI): BMI is a relationship between weight and height that is associated with body fat and health risk.

Booster Breaks: "organized, routine work breaks intended to improve physical and psychological health, enhance job satisfaction, and sustain or increase work productivity" (Wikipedia, 2010).

Cardiovascular disease (CVD): CVD refers to conditions or diseases of the heart and blood vessels in general, including coronary heart disease (CHD), angina, congestive heart failure, and high blood pressure, and stroke.

Coronary heart disease (CHD): also known as ischemic heart disease. It is the number one cause of death in the US. It causes reduced blood flow to the heart; typically caused by arteriosclerosis, a calcification of the arteries (World Health Organisation, 1997).

CDHB: Canterbury District Health Board, New Zealand.

Diabetes Mellitus: diabetes is a metabolic condition which results in raised blood glucose, a condition that leads to high morbidity and mortality in New Zealand. Type 2 diabetes is expected to affect 300 million people worldwide in the next two decades (Allender, Hutchinson, & Foster, 2008).

Duration: The length of time in which a person undertakes physical activity, expressed in minutes.

Exercise: exercise is a regular and structured subset of physical activity, performed deliberately and with special purpose, for example, in preparation for athletic competition or the improvement of some aspect of health.

Frequency: the number of times physical activity is undertaken expressed in bouts per week.

Health: "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organisation, 2004a). Negative health is associated with disease.

Health and Wellbeing: refers to the actual physical health of workers including physical or psychological illness and disease (Danna & Griffin, 1999).

Health-enhancing physical activity: "activity that, when added to baseline activity, produces health benefits" such as brisk walking, swimming or lifting weights (World Health Organisation, 2010)

Healthy Workplace: a workplace that "maximises the integration of worker goals for well-being and company objectives for profitability and productivity" (Grawitch, Gottschalk, & Munz, 2006).

Insufficient activity levels: less than 2.5 hours of physical activity per week (SPARC, 2003a).

Intensity: "intensity refers to how much work is being performed or the magnitude of the effort required to perform an activity" (World Health Organisation, 2004b).

Intervention: a specific prevention measure or activity designed to meet a programme objective.

Leisure-time activity: activities that a person undertake in daily life outside of work time that can contribute to total energy expenditure, for example gardening, or taking the stairs instead of the lift.

Likert scaling: "a psychometric scale commonly used in questionnaires, and is the most widely used scale in survey research. When responding to a Likert questionnaire item, respondents specify their level of agreement to a statement" (Wikipedia, 2010). Likert scales may be subject to distortion, for example central tendency bias and social desirability bias.

Metabolic Equivalent (MET): "a physiological concept expressing the energy cost of physical activities as multiples of resting metabolic rate (RMR) and is defined as the ratio of metabolic rate (and therefore the rate of energy consumption) during a specific physical activity to a reference rate of metabolic rate at rest. 1 MET is considered as the resting metabolic rate obtained during quiet sitting" (Wikipedia, 2010).

Moderate-intensity physical activity: undertake at least 2 hours and 30 minutes (minutes) a week of moderate-intensity physical activity, such as brisk walking.

MOH: Ministry of Health, New Zealand

Physical activity: "any bodily movement produced by the contraction of skeletal muscle that increases energy expenditure above a basal level" (World Health Organisation, 2004b).

Sedentary behaviour or sedentariness: sedentary behaviour has been associated with sitting, reclining or lying down during daytime hours. It is measured in behaviours in energy expenditure (EE) of 1.5 or less times resting EE (Matthews et al., 2008).

Self-report physical activity: participants' average minutes of moderate/vigorous intensity physical activity per day.

Vigorous-intensity physical activity: vigorous physical activity has been defined as undertaking at least three 20-minute sessions of vigorous activity each week, the equivalent to expending at least 1680 MET minutes/week (World Health Organisation, 2004a).

Well-being: reflects a person's self-described happiness and includes satisfaction and happiness regarding job satisfaction and job attachment within the workplace (Danna & Griffin, 1999).

Workplace: sometimes referred to as organisation. A workplace "...is a social arrangement which pursues collective goals, controls its own performance, and has a boundary separating it from its environment" (Wikipedia, 2010).

Workplace Health Promotion: is a combination of educational, organisational and environmental activities designed to support behaviour conducive to the health of employees and their families and reducing risk factors in employees (Conn, Hafdahl, Cooper, Brown, & Lusk, 2009; Conrad, 1988b).

1 INTRODUCTION

Physical activity is recognised worldwide as a necessity for maintaining optimal physical and emotional health; the benefits associated with physical activity are widely acknowledged. Physical inactivity is linked with poor health outcomes in both physical and mental health. The evidence associated with physical inactivity, to be reviewed later, is increasing worldwide, including in New Zealand, generating a demand for increased awareness of the minimum amount of physical activity required each day to produce health benefits. The problems associated with physical inactivity have been widely known for many years, the Ottawa Charter for Health 1986 attempting to address this problem at policy, community and individual levels (World Health Organisation, 1986). The increase in physical inactivity worldwide is considered by World Health Organisation (WHO) to be an epidemic in both the developing and developed countries, resulting in WHO recommendations to address this issue. Each individual country is encouraged to follow these recommendations and put into practice healthy policies which encourage health promotion that embraces the whole population regardless of age, gender and race.

Furthermore, WHO estimates that approximately one billion people worldwide, both in developed and developing countries are overweight (WHO, 2008). Research has shown a strong relationship between participation in regular physical activity and a decrease in chronic diseases such as cardiovascular disease (Schofield, Badlands, & Oliver, 2005). Chronic diseases, many of which are influenced by lifestyle factors, are a major concern for health workers in New Zealand. The main causes of mortality in New Zealand are “lifestyle diseases”; cancer, ischemic heart disease, and stroke (Ministry of Health, 2006). The New Zealand Public Health and Disability Act 2000 has identified thirteen health objectives to improve the health status of the population and also to reduce health inequalities given the poorer health status of those shown to be disadvantaged. These objectives include improving nutrition, increasing physical activity and reducing obesity (Ministry of Health, 2006). Physical activity is a key preventive measure to avert many non-communicable diseases and is recognised as the second highest modifiable risk behaviour to smoking for New Zealand (Ministry of Health, 2006).

1.1 PHYSICAL ACTIVITY DEFINED

It is generally agreed in the scientific community that physical activity refers to a physiological state of well-being involving any bodily movements that result in energy expenditure, whether it is incidental, occupational or recreational to meet the demands of living, including structured exercise, sport programmes and also incidental activity such as walking or cycling to work (Shephard, 1996; Warburton, Nicol, & Bredin, 2006). Physical activity is calculated as: brisk walking + moderate + (vigorous x 2); equivalent to one minute of vigorous activity being equated with two minutes of moderate intensity activity (Ministry of Health, 2006). Components of health related physical fitness include cardiovascular fitness, musculoskeletal fitness, body composition and metabolism (Proper, Koning, van der Beek, Hildebrandt, Bosscher and van Mechelen, 2003; Warburton et al., 2006; World Health Organisation, 2004a).

1.2 STATEMENT OF THE PROBLEM

Evidence has shown 30 minutes of physical activity or 10,000 steps per day produces significant clinical health benefits to an individual's health, however, those in sedentary occupations are more likely to not meet the minimum requirements to experience the health benefits associated with physical activity (Le Masurier, Sidman, & Corbin, 2003). Health benefits in adults occur by undertaking 30 minutes, five days a week, of moderate intensity physical activity, health can be gained through walking and is not restricted to organised sports or gym-based exercise (Department of Health, 2004). People moving from an inactive to an active state experience the greatest public health benefits, a dose-response relationship between physical activity and disease-related conditions (Gilson, McKenna, Cooke, & Brown, 2007).

In New Zealand, the Ministry of Health in following the guidelines given by the US Surgeon General, recommends that adults do at least 30 minutes of moderate-intensity physical activity (equivalent to brisk walking) on most, if not all, days of the week. Vigorous activity is encouraged, where possible, for extra fitness and health benefits. Half of all New Zealand adults (50.5%) in the 2006/07 Ministry of Health survey met the definition of being regularly physically active, however, not enough New Zealanders (between 32% and 56% of adults) are active enough to experience health benefits

(Ministry of Health, 2008; SPARC, 2003b). Despite the efforts of the Ministry of Health, SPARC, employers and health professionals, encouraging the rest of the population to undertake physical activity is a challenge. After adjusting for age, men (55.1%, 95% confidence interval, 53.4–56.9) were significantly more likely than women (47.9%, 95% confidence interval, 46.0–49.8) to do at least 30 minutes of physical activity a day on five or more days of the week. After comparing the trends in regular physical activity for adults over time, there was no significant difference in the prevalence of regular physical activity between 2002/03 and 2006/07, for both men and women, adjusted for age (Ministry of Health, 2008).

In New Zealand, there is an increase in occupations involving sedentary behaviour, possibly due to technological changes, contributing to some of the reasons for many of the working population not being able to meet the minimum recommended levels of daily physical activity. Sedentary behaviour has been associated with sitting, reclining or lying down during daytime hours. It is measured in behaviours in energy expenditure (EE) of 1.5 or less times resting EE (Matthews, Chen, Freedson, Buchowski, Beech & Pate, 2008). There is an increasing need for health promotion programmes to be incorporated within workplaces, particularly those involving predominantly sedentary behaviour, such as professional and white-collar occupations. Workplaces are ideal places to promote physical activity due to the limited cost and time commitment required for both employees and employers to implement programmes. The number of New Zealand adults in the labour force has increased from 66% in 2003 to 68.3% in 2010, rising employment opportunities encouraging more to enter, or remain in, the labour force (Department of Labour, 2010). A higher number of males (74.8%) compared to females (62.2%) are in paid employment. The high proportion of New Zealanders in paid employment provides an ideal opportunity for employers to help encourage employees to live a healthier way of life.

Promoting health in the workplace increases the chances of health and well-being (Marshall, 2004), providing support for employers to offer health promotion programmes or refer employees on to those organised external to the workplace. Studies of workplaces that incorporate health and wellness initiatives demonstrate lower health care costs and absenteeism and an overall improvement in physical and mental health, job performance, motivation and productivity (Aldana & Pronk, 2001; Grawitch, Gottschalk & Munz, 2006). However, studies investigating any association between physical activity and absenteeism are limited (Aldana & Pronk, 2001; Conn et al., 2009; Thogersen-Ntoumani, Kenneth, & Ntoumanis, 2005). Limited evaluation of the impact of workplace physical activity interventions has been carried out in New Zealand. This study aims to fill that gap,

examining a dose-response relationship between workplace support and physical activity. This study also aims to provide information on the outcomes from a New Zealand based health promotion programme called the 'Sea 2 Sea Challenge' organised by Sport Canterbury, involving various workplaces in the Christchurch region, New Zealand.

1.3 SEA 2 SEA CHALLENGE - TE WERO O TAI KI TAI

In 2007, Sea 2 Sea celebrated its fourth successful year of being the largest physical activity challenge in the Canterbury region (Christchurch, Rangiora, Lincoln, and Ellesmere). The programme aims to encourage people, specifically employers and employees in workplaces, practitioners and patients in primary care settings, community groups and people from low socio economic populations within the Canterbury region to be more physically active and to make people "more active, more often" (Sport Canterbury, 2007). The Sea 2 Sea Challenge lasted for six weeks, attracting employees from a variety of workplaces including blue collar, white collar and professional occupations. Participants participated in pairs, for every 30 minutes of activity completed by each participant, they cover a "virtual" distance of 3km, equating to walking a distance of 240km, equivalent to the distance from the West Coast to the East Coast (Sea 2 Sea). There is no restriction to the type of physical activity that is undertaken; the important thing is for participants to be moderately active for 30 minutes every day. Workplace participation and levels of physical activity were monitored through self-report activity charts. A buddy system was encouraged among workplaces to "buddy up" with someone from their workplace or a family member and those working in the primary care setting were encouraged to support and encourage their patients to get involved too.

Two previous evaluations had been carried out on the Sea 2 Sea Challenge; one covered the Canterbury region and one for the South Canterbury region (Dowman & Hamilton, 2006; Nichol, 2007). The current study adds to the previous evaluation, which covers from when the challenge first began in 2004 to 2007. The study measured individual as well as workplace physical activity levels and workplace and workplace coordinator support. The previous study reviewed individuals that participated only in the 2007 Sea 2 Sea Challenge. The study employed a quantitative design, using a simple random sampling method and covered a small number of respondents, less than 120 respondents at three different intervals, before, during and after the challenge. The second

evaluation mentioned was restricted to individuals and workplaces only in the South Canterbury region for 2007.

1.4 A SUMMARY OF HEALTH NEEDS IN CANTERBURY

The current study concerns those employed in the Canterbury region, therefore, an overview of current health status of people residing in the Canterbury region is given (Canterbury District Health Board, 2004). In 2001, the population for Canterbury was 427,089, between 1991 and 2001 the population grew 11% which is forecast to continue to increase another 17% by 2021, the total population to be approximately 500,000. The percentages of those who make up the ethnicities of those in the study and who do not identify as European/Pakeha include Maori (6.7%), Pacific people (2.0%) and Asian (4.4%). Although there were other ethnicities residing in Canterbury at the time of this report, these percentages were not given. Although Canterbury has few areas of deprivation, 19% of Canterbury's population live in the most 'deprived' areas; NZDep01 scores (NZ Deprivation Index 2001 deciles 8-10). Disease of the circulatory system (ischemic heart disease, stroke, and heart attack), cancers, and respiratory, mental and endocrine disorders are the main diseases contributing to deaths in Canterbury. Smoking is considered the main preventable cause of death among children, middle-aged adults and the elderly. Canterbury District Health Board is the largest employer of health workers in Canterbury (Canterbury District Health Board, 2004).

1.5 STUDY AIMS

The purpose of this research was to investigate the relationship between workplace participation in, and support for, a physical activity initiative, the Sea 2 Sea Challenge, and the physical activity outcomes obtained by the individual participants from those workplaces. The aims were as follows:

1. Establish the level of self-reported physical activity of all individuals for whom physical activity charts were available.
2. Establish the amount of time each participant reported dedicating to physical activity, this time being equated to distance at a rate of ten minutes per one kilometre.
3. Establish the level of individual participation in Sea 2 Sea for each participating workplace.
4. Establish the level of support by workplace co-ordinators to encourage participation from employees in the workplace.

This study investigated the following research questions:

1. Was there an association between levels of workplace participation in Sea 2 Sea and individual physical activity?
2. Was there an association between support from workplace co-ordinators and the number of Sea 2 Sea participants from each workplace and/or their level of self-reported physical activity?

1.6 SIGNIFICANCE OF THE RESEARCH

The significance of this research is that it will: add to the limited health promotion literature on workplaces, particularly around a physical activity intervention involving employees from various workplaces and their workplace support, objectively evaluate physical activity levels in the workplace setting, and identify workplace support for physical activity, provide recommendations for future health promotion programmes in New Zealand, particularly in regards to workplace physical activity interventions, aimed at encouraging daily physical activity in employees.

2 PHYSICAL ACTIVITY AND HEALTH

The following chapter will give an outline of the different aspects related to physical activity, particularly physical activity programmes within the workplace. The situation of physical activity levels within New Zealand is also discussed.

2.1 INTRODUCTION

This literature review serves the purpose of summarising the research conducted around health promotion, with an emphasis on promoting physical activity within the workplace. Previously, literature written on physical activity coined the term exercise, physical activity becoming a preferred term to use to explain physical exertion only recently.

For the purposes of the research, a review of past and current literature was carried out with the intention of providing a general background to workplace health promotion, primarily physical activity interventions, and its influence on various aspects of a person's life. Physical activity levels undertaken by New Zealanders and the impact this has been on health and well being are discussed.

A limit had to be placed on the extent of the review carried out in order to keep the literature relevant to the thesis topic. It is acknowledged by the researcher that transition from childhood to early adulthood has an influence on physical activity levels, and their levels decrease in older years, however, for the purposes of this study only the current status of working adults physical activity levels will be reviewed.

Countries worldwide are experiencing a decline in health and well-being due to increases in physical inactivity, with more than one factor contributing to this current health problem. The Chief Medical Officer for the UK Department of Health (2004) stresses the current major public health challenge for developing countries is physical inactivity which is also fast becoming an epidemic. Daily energy expenditure has been on the decline in most western countries throughout the industrial revolution of the 19th and 20th centuries and the technological revolution of the latter half of the twentieth century (Giles-Corti & Donovan, 2003). It is becoming a major public health challenge, making it a worldwide phenomena, despite government interventions (Saris et al, 2003; Thomas, Hodge & Smith, 2009; Titze, Martin, Seiler, Stronegger & Marti, 2001). Physical inactivity accelerated after World War II due to increases in population, economic expansion, changes in the social and work environment and manual activity replaced by a steady increase of mechanisation at work, in the home and during leisure time (Allender et al., 2008; Saris et al, 2003; US Dept of Health and Human Services, 1996; World Health Organisation, 2004b). The movement from rural to urban life has also contributed to the decline in physical activity worldwide (Saris et al, 2003).

Physical inactivity is estimated to cause 1.9 million deaths worldwide annually (World Health Organisation, 2004a), population risk attributable to inactivity associated with 8% of deaths in New Zealand alone (Bauman, McLean, Hurdle, Walker Boyd & van Aalst, 2003). To address this issue, the US Surgeon General recommends a minimum of 30 minutes of physical activity each day to decrease the risk of chronic disease and mortality. Although the health benefits outweigh the risks, participation in leisure-time physical activity is low in industrialised countries, a high number, approximately 60% of the global population, are not meeting the recommendations of the U.S Surgeon General in the U.S or national targets set in other countries. Approximately 1 in 4 American adults meets the current recommendations through leisure-time physical activity (Craig, Brownson, Cragg, & Dunn, 2002; Hamer & Chida, 2007; Haskell, Lee, Pate, Powell, Blair & Franklin, 2007; Pate, 1995; Stamatakis, Ekelund, & Wareham, 2007). Earlier research shows that physical inactivity has been an ongoing problem throughout the 1980s and 1990s. The US Surgeon General set a national goal of having 60% of adults engaged in vigorous physical activity by 1990 (Blair, Piserchia, Wilbur, & Crowder, 1986). These guidelines are relevant today as physical inactivity continues into the twenty-first century.

However several experts are questioning the recommendations set by the US Surgeon General, this guideline is considered insufficient for many individuals wanting to prevent weight gain or regain (Bauman, Armstrong et al., 2003; Saris et al, 2003). It is recognised by some researchers that physical activity levels necessary to maintain energy balance and a stable body weight in a weight-reduced/obesity-prone individual or population may by very different to individuals who are not prone to obesity or to maintain a healthy weight. The number of randomised controlled trials measuring whether physical activity prevents weight gain, and if so, how much physical activity is required is very limited (Saris et al, 2003). With the prevalence in obesity and overweight in developed countries, recommendations for optimal physical activity levels for weight loss or preventing general weight gain or regain can be expected in the near future.

2.1.1 Vigorous versus moderate physical activity

Previously it was thought to achieve good health an individual should undertake vigorous amounts of physical activity, however, mainly moderate amounts of physical activity are now promoted by health professionals, although, new research indicates there are benefits and limitations. Previous research has focused on vigorous activity; however there is epidemiological evidence that benefits to health such as heart disease and diabetes prevention and hypertension control, similar to that

provided by vigorous activity, are found in regular participation of moderate-intensity activity (Bauman, McLean et al., 2003; Department of Health, 2004; Giles-Corti & Donovan, 2002).

Vigorous physical activity has been defined as undertaking at least three 20-minute sessions of vigorous activity each week, the equivalent to expending at least 1680 MET minutes/week. Although vigorous activity is encouraged, promotion of moderate physical activity is also promoted by health professionals to encourage those currently physically inactive to become active. Moderate physical activity has been defined as consisting of at least 30 minutes of moderate daily physical activity and expending 840 MET minutes/week (Giles-Corti & Donovan, 2003; World Health Organisation, 2004b). Achieving moderate amounts of physical activity is more realistic for those currently inactive, smaller bouts of activity (2-10minutes) accumulated over the day to have shown measurable health benefits, with evidence showing similar cardiovascular fitness, decreased body weight, blood lipid responses and anthropometric variables compared to one continuous portion of activity (Hardman, 2001; Murphy & Hardman, 1998; United States Department of Health and Human Services, 1996).

2.1.2 Barriers to Achieving Physical Activity

Barriers to achieving physical activity requirements are common despite the benefits associated with health and physical activity. Walking is considered popular in Australia, however, too few Australians engage in adequate walking for health benefits, requiring a comprehensive strategy be employed to address the promotion of walking to be associated with health benefits (Giles-Corti & Donovan, 2003). Contrary to this, nearly 10% of Americans report walking as an unacceptable form of transport, and time inconveniences, poor weather, and substandard health reported as barriers to walking for transport, although one study did not find this result. A study on cycling behaviour in men found minimum daily temperatures and rainy days were negatively associated with cycling Rafferty et al. 2004 as cited in (Badland & Schofield, 2005). To counteract negativity around physical activity, it is suggested that promoting the need for people to be physically active be accompanied with a positive message and strategies be put in place for promoting the message of incorporating walking into daily life (Giles-Corti & Donovan, 2003).

Studies also indicate life circumstances have an effect on individual's participation in physical activity (Allender et al., 2008). In their systematic review of qualitative research into barriers and motivations (Allender et al., 2008) found that individual's participation in physical activity is

influenced by life circumstances. For example, although 69% of women aged 15 years met UK government physical activity guidelines; only 25% of women aged 16-24 met the guideline. Some life changing events which are known to have an influence on physical activity levels include the transition from childhood to adulthood, changing schools, first time employment, changing trends for types of activity, becoming disabled and death of a spouse (Allender et al., 2008). The conclusions to this study were that life changes were found to have a negative effect on participation in physical activity and the impact of changes in life events or life circumstances on physical activity participation needs to be addressed in order to increase or possibly reverse trends in current population physical activity levels (Allender et al., 2008). Constraints to this review are restricted to literature on Pub Med, a small range of participants, and reliance on self-report of physical activity levels, limiting the generalisation of the findings. A concern for self-report studies is participants over-estimating their levels of physical activity (Ainsworth, Bassett, Strath, Swartz, O'Brien & Thompson, 2000)

2.2 ACHIEVING INTERNATIONAL PHYSICAL ACTIVITY GUIDELINES

Achieving international physical activity guidelines can be a challenge for some population groups, many individuals are not taking up the message of the US Surgeon General, indicating a need for more resources to be assigned to promoting the benefits and importance of physical activity. The promotion of physical activity has been given increased importance on the public health agenda due to the increase in the burden of chronic disease internationally (World Health Organisation, 2004a). Rates of physical activity participation in developing countries remained the same or decreased, despite an increase in interest in physical activity; while in some developed countries, physical activity participation has decreased and obesity rates have soared (Bauman, McLean et al., 2003). In 1996 the US Surgeon General published a report on the health benefits of physical activity, leading to New Zealand and Australia developing national health policies based upon this report (Egger, Donovan, Corti, Bull, & Swinburn, 2001). Public health priorities identified by both countries include cardiovascular disease, cancer, diabetes, musculoskeletal injury and depression (Egger et al., 2001).

A limitation in comparing physical activity data sets from various countries stems from the different definitions of what is considered ‘sufficiently’ active, for example, when the measurement of physical activity changed from 60 minutes to 30 minutes per day. In the Health Survey for England, reported levels of inactivity diminished from 62.7% to 42.3%, resulting in rates of inactivity

comparable to other countries (Hohepa, Schofield, & Kolt, 2004). The New Zealand classification survey also has its shortfalls, for example, achieving 150 minutes of moderate activity over a week is considered sufficiently active (Schofield et al., 2005). The international criterion measures sufficiently active levels as completing 150 minutes in at least five separate bouts across the week. For example, as defined in the current National Physical Activity Guidelines for Australians, accrual of >150 minutes of at least moderate-intensity activity through five or more sessions per week is considered 'sufficient' to provide health benefits (Bauman, McLean et al., 2003). Comparing the two different classifications for measuring sufficiently active levels, the same participants in the New Zealand survey reported different results when using the international criterion, indicating only 44% of the same participants to be sufficiently active (Schofield et al., 2005). In conclusion, the different criteria used in New Zealand shows an increase in the number of New Zealanders classified as sufficiently active, this trend being contrary to other countries as a decrease in adult physical activity is reported in Australia and the United Kingdom (Bauman, McLean et al., 2003).

The International Association for the Study of Obesity (IASO) and the US Institute of Medicine (IOM) reported current physical activity recommendations of 30 minutes moderate physical activity in preventing disease had many health benefits, however recommended 60 minutes of moderate-intensity physical activity or lesser amounts of vigorous physical activity for weight maintenance (Bauman, McLean et al., 2003; Saris et al, 2003). Evidence illustrates duration of 60-90 minutes of moderate physical activity is required to prevent weight regain in previously obese individuals. Prevention from the transition to overweight or obesity requires between 45-60 minutes of moderate physical activity per day. Recommendations to increase levels of physical activity to meet the daily requirements include incidental and leisure-time activity (Bauman, Armstrong et al., 2003; Saris et al, 2003). In a study involving individuals exercising at moderate intensity >200 minutes per week experienced higher weight loss compared to the >150 min group at 18 months. However, it is important to note that recommendations by the US Surgeon General regarding physical activity levels of 30 minutes of physical activity each day target overall cardio respiratory fitness and general health and not weight loss (Saris et al., 2003).

2.2.1 The situation in New Zealand

Physical activity levels of New Zealanders' are following the same trend observed in other western countries, decreasing activity amongst the population in favour of a more sedentary lifestyle. In 1998, a national Physical Activity Taskforce was formed specifically to address the increasing

population levels of inactivity, implementing the physical activity recommendations of the US Surgeon General. Sport and Recreation, New Zealand (SPARC), (formerly The Hillary Commission) conducted a national media campaign known as the 'Push Play' campaign to raise awareness of the physical activity guidelines. The social marketing brand 'Push Play', "…was designed to reflect positive values of being upbeat, fresh and clean, fun, Kiwi, and family based, and recommending lifestyle physical activity" (Bauman, McLean et al., 2003, p. 2). A national 'Push Play' day was celebrated on 9 November 2001. Other ongoing national programmes include the Green Prescription Scheme initiated in 1999, using written/verbal advice from General Practitioners to motivate patients to be more physically active, and He Oranga Poutama established in 1997, a programme encouraging healthy, active lifestyles for Maori (Bauman, McLean et al., 2003). In reviewing the 'Push Play' campaign, the results show an increased awareness of physical activity and intention to be active (from 1.8% to 9.0%) among adults in New Zealand from 1999-2000 (Bauman, McLean et al., 2003). Across the country, various Primary Health Organisations (PHOs) have been implemented or supported programmes to promote physical activity, such as Partnership Health Canterbury. "Be Active" programmes were delivered in different locations across the region to increase the use of Green Prescriptions and provide a supportive group environment for those wishing to increase their level of physical activity.

2.2.2 Physical activity levels of New Zealand adults

An epidemiological survey carried out by the Hillary Commission and Sport and Recreation New Zealand (SPARC) between 1997-2001 showed an increase of 3% in the number of adults who are sufficiently active (Bauman, McLean et al., 2003). According to a national survey by SPARC over a five year period (1997-2001) measuring physical activity levels, 68% of New Zealanders were classified as sufficiently active (SPARC, 2003). However, despite the prevalence of physical inactivity world-wide, the increase in chronic disease and the vast evidence for the benefits of physical activity, physical activity rates are not increasing. Only half of all New Zealand adults (50.5%) in the 2006/07 Ministry of Health survey met the definition of being regularly physically active, a decrease in activity levels from the 1997-2001 survey mentioned above.

2.2.3 Physical activity levels of New Zealand adolescents

SPARC (2003) report some alarming trends occurring amongst adolescents in New Zealand. In a survey carried out at three time points, 1997/98, 1998/99, and 2000/01, examining physical activity and inactivity trends amongst adolescents, the results show 37% of New Zealand adolescents aged

13-17 years are not meeting the recommended guidelines by the US Surgeon General. Adolescents of Pacific origin, compared to Maori and Europeans, were considered the least active (Bauman, McLean et al., 2003; Hohepa et al., 2004; Ministry of Health, 2008; SPARC, 2003). Although this literature review is mainly focusing on adults between 18-75 years, the statistics relating to adolescents and physical inactivity is highlighted because of several trends occurring world wide. The statistics report a decrease in physical activity levels from childhood to adolescence, and females (45%) are more physically inactive than males (33%) (SPARC, 2003). Further to this, research carried out in England, Australia and Canada and the US report a decline in physical activity from ages 15-18 years. This further declined from ages 18-29 years, and males participated in more moderate and vigorous physical activity compared to females (Hohepa et al., 2004). The trend in these statistics occur in the working population due to similar behavioural patterns that transfer from adolescence to adulthood (Hohepa et al., 2004).

2.2.4 Physical activity levels by ethnic group

Results in the Ministry of Health 2006/07 survey for regular physical activity for adults by ethnic group, reported Asian men and women were less likely compared to men and women in the total population to meet the recommendations by World Health Organisation (WHO) of 30 minutes of physical activity on five or more days of the week. Physical activity levels among European/Other men and women are consistent with earlier studies by the Ministry of Health, demonstrating a slightly increased prevalence of regular physical activity compared to men and women in the total population. The Maori female population however, received recognition as being more physically active than females in general, a finding which is significant for health promotion in New Zealand and a positive outcome for a population group to achieve the guidelines.

The study 'Obstacles to Action' by SPARC (2003) identified motivators and barriers to physical activity to improve public health interventions in New Zealand and reported those likely to be more inactive were females, those overweight or obese, and those having a higher education or a chronic condition. On the other hand, those more likely to be sufficiently active were those who were single, received a trade-related education, Maori, high income, or had access to recreational facilities (Phongsavan, McLean & Bauman, 2007). This result can be confusing for health promoters as Maori have high statistics in cardiovascular disease and coronary heart disease (Ministry of Health, 2008), although other factors causing this could play a role here. Individuals with high physical activity self-efficacy reported sufficient physical activity levels (75.3%) and high emotional support. The study

employed the New Zealand Physical Activity Questionnaire Short Form (NZPAQ-SF), with a response rate of 61%, and recording of respondents' number of days and minutes of brisk walking. The NZPAQ-SF was validated against the NZPAQ Long Form and the International Physical Activity Questionnaire Long Form (IPAQ-L). The study followed the guideline set by the US Surgeon General, of 150 minutes over five or more days per week, individuals meeting this guideline were considered to be 'sufficiently active' (Phongsavan et al., 2007).

2.2.5 Physical activity levels in the United Kingdom

According to recent trend data, it is believed current interventions to promote sport and physical activity in the United Kingdom (UK) are inadequate (Allender et al., 2008). Targets reflecting the increasing social, political and health policy importance of physical activity set by governments in developed countries, are considered ambitious (Allender et al., 2008; Wenn, Orr, Bindon, & Rissel, 2005). In the UK, the government has set a target by 2020, at least 70% of the population to be participating in 30 minutes of physical activity at least five days per week. However Allender et al. (2008) states this target is considered quite ambitious due to only 37% of men and 24% of women in the UK currently meet the international guidelines. According to the UK Joint Health Surveys Unit, 2004, the number of physically inactive people (less than 30 minutes of physical activity per week) was on the rise, regardless of gender or age (Armstrong, Bauman, & Johnson, 2000; Thomas, Hodge, & Smith, 2009; Wenn et al., 2005; World Health Organisation, 2004a).

2.2.6 Physical activity levels in Australia

Although a high number (51%) of Canadian adults are recorded as physically inactive, (Warburton et al., 2006), Australia currently experiences a higher rate of decline in physical activity compared to the United States, the United Kingdom, Canada and New Zealand (Bauman, McLean et al., 2003). Similar findings supporting the conclusion of decline in participation in physical activity reached by Bauman, McLean et al., (2003) were identified by the Australian Bureau of Statistics. A study by Bauman, McLean et al. (2003) showed some disturbing trends in physical activity prevalence, physical activity participation in Australian adults declining by 5.7% in two years. The percentage of people in employment and the average hours worked per week in Australia have increased, with potentially a higher risk of decreasing activity levels. In Australia, 25% of full-time workers work 49 hours per week or more, an increase of 5% since 1988. Currently one half of adult Australians do not meet the recommendations of 30 minutes or more of moderate-intensity physical activity (Thomas et al., 2009). To address the levels of physical inactivity in Australia, implementation of intersectoral

physical activity planning and a well-funded public awareness campaign proved successful in the study, with increased awareness and less decline in physical activity as a result (Bauman, McLean et al., 2003).

Although awareness campaigns are effective for reaching a large proportion of the population, however, it is important that individuals form regular habits around physical activity. Forming physical activity habits can lead to positive outcomes, for example, in an Australian study, it was found that individuals who focused on being physically active in the next two weeks were twice as likely to be physically active compared to those not intent on being active. Respondents with a positive attitude towards physical activity and who had been physically active in the last three months were approximately 45% more likely to achieve recommended levels of physical activity compared to people who were inactive (Giles-Corti & Donovan, 2003). It was also reported that 78.2% of Australians achieving recommended levels of activity were found amongst those who implement walking and other physical activities in their daily lives (Giles-Corti & Donovan, 2003).

A greater proportion of resources need to be used in encouraging adults to become more physically active, due to the very high burden of disease and disability associated with physical inactivity, rather than the money being spent on other current public health priorities (Bauman, McLean et al., 2003). Physical activity remains under-resourced compared to other under-funded areas of public health. New Zealand, the UK and Australia are currently facing an epidemic of obesity and sedentariness, the direct costs attributed to sedentariness already very high. According to (Bauman, McLean et al. (2003), awareness-raising campaigns, professional education and integrated strategic planning is believed to be essential to increase physical activity participation amongst the New Zealand population.

2.3 PHYSICAL ACTIVITY LEVELS ACROSS GENDER

Participation in physical activity varies among New Zealanders', researchers reporting a discrepancy in participation levels by gender when it comes to preferences for physical activity. Men preferred more competitive sports and weight lifting compared to women who selected less vigorous physical activity such as walking and dancing. Men may experience more health benefits than women due to men participating in more vigorous and longer duration physical activity (Saris et al, 2003). The most recent statistics on physical activity for gender report men in the 15-24 year age group were

approximately 1.5 times more likely than women to complete at least 30 minutes of physical activity a day on five or more days of the week. Men aged 75 years were also found to be more physically active than women of the same age (Ministry of Health, 2008).

Making direct comparisons by gender has proved difficult in most of the trials measuring physical activity on body composition. In a meta-analysis on BMI in men and women, results are different for both genders; however no reason is given for the possible reasons on why this is (Saris et al, 2003). Another review reporting physical activity levels, found only 3/35 studies that included both men and women and none of them reported gender separately. Reporting on the differences between the genders has proven to be important as one study pointed out, men compared to women, are more likely to benefit in less than 15% weight regain when exercising for 600 minutes of brisk walking per week as they prefer vigorous and longer duration of physical activity. A higher chance of weight regain (40%) occurs in those that undertake approximately 210 minutes of brisk walking per week. This provides health professionals with the question: does this mean that separate physical activity recommendations and guidelines are needed for men and women? The findings suggest that recommendations for physical activity may need to consider gender differences in the protective effects of activity on weight gain (Saris et al, 2003).

These differences and the need for separate physical activity recommendations and guidelines for each gender have been addressed in the past with the *Push Play* campaign (Phongsavan et al., 2007; SPARC, 2003a). Other factors may also play a role such as age, social and economic circumstances, physical limitations, and individual preferences, self-efficacy, social support, and environmental factors (Phongsavan et al., 2007; Saris et al, 2003; SPARC, 2003a). It is important that making assumptions about associations does not necessarily match across populations and gender groups. However, it is also noted there are limitations in addressing these differences as a single population-based guideline (Phongsavan et al., 2007). The New Zealand and Australian physical activity guidelines attempt to address gender, and other differences (Phongsavan et al., 2007; SPARC, 2003a), however, it is unknown how effective these are in a broad population promotion (Saris et al, 2003).

The social and physical environment is increasingly influencing physical activity levels among men and women, policies within health promotion programmes reflecting this change. Physical activity self-efficacy and social support has been shown to be strongly associated with physical activity in women compared to men (Phongsavan et al., 2007). Results in one study show self-efficacy and social support led to the adoption of physical activity by sedentary women, while self-efficacy was

associated with vigorous physical activity in men only (Sallis, Hovell, Hofstetter, Elder, Hackley & Caspersen, 1990). In a more recent study, psychosocial influences and self-efficacy varied in importance depending on gender and age (De Bourdeaudhuij & Sallis, 2002). Differences were observed between the physical environment and gender; men are more likely to participate in physical activity than women if physical activity related facilities are accessible (Phongsavan et al., 2007).

2.4 TIME SPENT IN SEDENTARY BEHAVIOURS

Sedentary behaviour is on the increase in western countries, many factors are contributing to this change, creating a need for health promoters to address this issue. Sedentary lifestyles are becoming more common in industrialised countries, mainly due to lifestyle, environmental and technological changes, and a trend posing a major health risk. WHO (2004) estimates 1.9 million deaths worldwide and more than 250,000 Americans die annually from insufficient physical activity (Taylor, 2005; Tudor-Locke & Myers, 2001). Sedentary behaviour such as television viewing, video game-playing, and computer use currently determine approximate amounts of time spent in sedentary behaviour in western countries. A New Zealand study along with other studies, has reported a link between physical inactivity, obesity, television viewing and computer use Matthews et al 2008 (Armstrong et al., 2000; Badland & Schofield, 2005; Badland & Schofield, 2004; Giles-Corti & Donovan, 2003; Hohepa et al., 2004).

Physical inactivity in New Zealand is on the increase, the Ministry of Health (2008) reported one in seven adults (15.0%) completed less than 30 minutes of physical activity per week, females more likely than men to be sedentary. Asian and Pacific men and women were significantly more likely to be sedentary compared to men and women in the total population, after adjusting for age. A significant increase in the number of women who were sedentary (p-value < 0.05), occurred from the 2003/03 survey to the 2006/07 survey, after adjusted for age, Maori adults showing no change between the two surveys (Ministry of Health, 2008).

Sedentary behaviours show a link between insufficient time spent in physical activity and poor health status. Time spent in sedentary behaviours has been independently associated with lower levels of physical activity energy expenditure, increased risk of weight gain, and increased risk of metabolic syndrome, diabetes, and heart disease (Matthews et al., 2008). Lifestyle factors had an

influence on weight as watching television for three or more hours a day doubled the odds of being overweight (Giles-Corti & Donovan, 2003). In a review of sixteen cohort studies, 10 studies reported an association between television watching and an increased risk of weight gain and/or obesity, nine studies were statistically significant (Anderson, 2008). It is recommended individuals incorporate more incidental and leisure-time activity into daily life, reducing sedentary behaviour and meeting the 30 minute goal of daily physical activity (Saris, Blair, Van Baak, Eaton, Davies & Pietro, 2003). It is appropriate that health promotion and obesity and disease prevention efforts target sedentary behaviour and encourage people to move from inactive to moderate levels of activity.

2.5 PHYSICAL ACTIVITY LEVELS ACROSS OCCUPATION

It is difficult to measure activity levels of employees as some occupations require different amounts of activity, some work roles consist of minimal physical activity compared to others. With the development and continual updating of labour-saving devices used in workplaces, particularly manufacturing, assessing occupational physical activity based upon job titles and job activities is becoming less important (Steele & Mummery, 2003). A large number (66%) of New Zealanders are in paid employment, occupation types consisting of different levels of activity, leading to different total amount of physical activity accumulated over a day. The use of 10,000 steps as a useful quantifiable target to measure the physical activity levels of individuals is useful, however, the number of steps taken during the working day is unknown (Steele & Mummery, 2003). How occupational and leisure-time activities contribute to overall physical activity levels is yet to be determined, as only few studies have objectively measured work-related physical activity (Conn et al., 2009).

To fill this gap in epidemiological research a study that is unique to New Zealand objectively measured physical activity in New Zealand workers through use of a pedometer. The study reported total daily physical activity by gender and occupation (Schofield et al., 2005). A convenience sample of participants was recruited among full-time employees in workplaces in two big cities in New Zealand: Auckland and Christchurch. Participants were recruited via email and door knocking around the university, city and industrial areas, raising questions on the generalisation of the findings of the study due to selection bias in the sample. Six occupational categories were identified including office, retail, university academic, university allied, nurse/aid, and blue collar workers. At the time of this study, only four pedometer-based occupational studies had been carried out, two were in Australia and in the United States, two involved professional employees only, and two older age-

related study using similar occupation groups to the current study. The study found little evidence to support a difference observed in gender, the only differences, although not significant were that females had higher non-work step values and males had higher work step values. Previous research reports men being more active during work time compared to women being more active during leisure time (Schofield et al., 2005). Consistent with other studies, measuring daily physical activity levels, less than half of all participants met the minimum physical activity levels recommended by the US Surgeon General. Findings from the study include blue collar workers accumulating more steps in the workplace (71.1%) followed by nurse/aids (62.8%). This is a different figure to that obtained by Ministry of Health (2008) for all New Zealanders, which found more than half (60%) met the minimum requirements in the 2006/07 study. The main finding in the study was that no association was found for hours worked and levels of physical activity for work and non-work pedometer values. It was reported that physical activity occurred less during work hours compared to leisure time. Significant differences for retail and blue collar workers compared to other occupational categories were also found, blue collar workers accumulating more steps than any other occupation (71.1%), nurse/aids featuring second (62.8%). Another significant finding found occupations involving sitting had lower step counts than other occupations involving more active movement (Schofield, Badlands & Oliver, 2005).

No association between the total physical activity levels and the number of hours spent at the workplace was found, excluding the possibility of a decrease in physical activity due to increasing work hours (Schofield et al., 2005). However, a meta-analysis reported that the higher the number of hours worked to be associated with an increase in health symptoms (Danna & Griffin, 1999). Although previous literature has identified differences between workplace physical activity levels and different occupations, the way in which different occupations contribute to total daily physical activity is unknown. A cross-sectional study that measured accumulated physical activity in the workplace such as desk-based jobs and ambulatory-oriented occupations has shown significant differences (Chan, Spangler, Valcour, & Tudor-Locke, 2003). A Swiss study comparing similar objectives was lower in step counts for the different occupation groups (Sequeira et al., 1995), while an Australian study of professional, white collar and blue collar occupations reported the highest step counts (Miller & Brown, 2004). The difference in health benefits between workplace and leisure-time physical activity are largely unknown, the current physical activity guidelines making no distinction between them. One study Gutiérrez-Fisac et al. (2002) found no association between obesity and workplace physical activity, another study King, Fitzhugh, Bassett, McLaughlin, Strath & Swartz (2001) relates obesity to both workplace and leisure-time physical activity. Based on the New

Zealand study, there is an association between physical activity and occupation, however, the contribution of occupational physical activity to overall activity levels and associated health benefits requires further investigation (Schofield et al., 2005). Caution in generalising the results to all workers is given by the researchers due to the cross-sectional study not being representative of all New Zealand workers (Schofield et al., 2005). Findings from the above studies have highlighted the importance of measuring physical activity levels by occupation compared to limiting studies to leisure time activity (Schofield et al., 2005).

2.6 BENEFITS OF PHYSICAL ACTIVITY: UPDATING THE EVIDENCE

The important role physical activity has in individual's level of health and well-being is generally well accepted. Numerous studies published since 2000 have provided more evidence on the accumulating effects physical activity has on a person's health. Current evidence available through peer-reviewed scientific literature indicates clearly that walking reduces the risk of cardiovascular disease and reinforces the understanding of the protective effects of moderate physical activity on cardiovascular health (Bauman, Armstrong et al., 2003; Hardman, 2001; Murphy & Hardman, 1998). Cancer has become a widely researched topic; over 100 epidemiological studies have covered physical activity and its relationship to cancer. Breast cancer prevention and colon cancer showing the best evidence of the protective effects from physical activity, though uncertain or mixed evidence remains for the primary prevention of other cancers (Anderson, 2008; Bauman, Armstrong et al., 2003; Warburton, Nicol & Bredin, 2006). Further benefits supporting the evidence of physical activity for health includes its possible role in the treatment of mental illness, well-being such as mood, self-perceptions and self-esteem (Bauman, Armstrong et al., 2003; Thogersen-Ntoumani et al., 2005). There have also been numerous studies determining other benefits of regular physical activity such as an improvement in sleep patterns, alertness and dealing with stress (Yancey et al., 2004).

Researchers on physical activity, energy expenditure and body-weight composition affirms the importance of the message of the US Surgeon General for preventing a number of non-communicable diseases such as coronary heart disease, obesity, back pain, poor joint mobility, diabetes and hypertension which is the second most avoidable cause of illness after smoking (Batty & Lee, 2004; Bauman, McLean et al., 2003; Department of Health, 2004; Ministry of Health, 2006; Warburton et al., 2006; World Health Organisation, 1997).

The dose response relationship between physical activity and all cause mortality (ACM) is confirmed through recent studies. Those who are inactive and become physically active, moving to the middle of the cardio-respiratory fitness distribution curve, achieve maximum benefits of ACM, with increased levels of activity producing smaller additional benefits (Bauman, McLean et al., 2003; Woodcock, Franco, & Orsini, 2010). Long term follow-up studies by various researchers covering the relative risk of death from any cause and from specific diseases, for example, CVD have been shown to be associated with physical inactivity. A systematic review and meta-analysis in 2007 covering over 33 studies with approximately 800,000 participants ranging in follow-up from 4-20 years, for adults, reported significant risk reductions for participants showing to be physically active in a large number of studies. An inverse association between physical activity and ACM was found; lower risk reductions were reported in studies that used questionnaires compared to studies that used objective measures of fitness. Those undertaking seven hours per week of physical activity had a decreased mortality risk of 24% compared to those who were sedentary, a smaller effect found in studies involving only walking (Woodcock et al., 2010). A systematic review found studies of physical activity and ACM from Australasia (one study) compared to Europe (eight studies), North America (eight studies), and East Asia (five studies), (Woodcock et al., 2010). In studies in the USA and in Britain, walking for more than 40 minutes a day and moderate or heavy gardening was found to be protective, however light gardening produced no significant impact. Those previously inactive who became moderately active experienced a 42% risk reduction of all-cause mortality (RR 0.58, 95% CI 0.33 to 1.03, p=0.06) (Bauman, McLean et al., 2003). A break-down of some of the non-communicable diseases associated with physical inactivity is outlined below.

2.6.1 High blood pressure

High blood pressure (hypertension) is an important risk factor for heart disease, as well as stroke and renal failure. Physical activity is one of the modifiable risk factors for high blood pressure (Guyton & Hall, 1946). Between 2002/03 and 2006/07 there was an increase in the prevalence of New Zealand men and Maori men and Maori and Pacific women taking medication for high blood pressure, adjusted for age (Ministry of Health, 2008).

2.6.2 Cardiovascular disease

Those who are sedentary with no risk factors for cardiovascular disease (CVD) are at higher risk than those who are physically fit with no risk factors for CVD (Warburton et al., 2006). Regular physical activity provides protective benefits in the secondary prevention of CVD and decreases the risk of

premature death. Rest and physical inactivity were the messages given to patients with heart disease, previous to physical activity research being shown to be beneficial to health. The importance of patients participating in physical activity to slow down or reverse the disease process, have been supported by several systematic reviews (Warburton et al., 2006).

2.6.3 Overweight and obesity

Overweight and obesity in the adult population is reaching epidemic proportions and is considered a complex phenomenon experienced by both developed and developing countries throughout the world, influenced by factors such as genetics, physical inactivity and the environment (Anderson, 2008; Barnes, Maclean, & Cousens, 2010; Hohepa et al., 2004; Saris et al, 2003). Overweight and obesity are becoming more widely recognised as being responsible for ill health and premature death for both individuals and populations. Obesity is associated with a long list of adult health conditions, including CVD (ischemic heart disease, high blood pressure and stroke), type 2 diabetes, coronary heart disease, some types of cancers, kidney disease, fatty liver disease, osteoarthritis, pulmonary embolism, deep vein thrombosis, polycystic ovarian syndrome, gout, gallstones, reproductive disorders, sleep apnoea, complications in pregnancy, complications in surgery, and psychological and social problems and shortens life expectancy by nine years on average (Giles-Corti & Donovan, 2003; Hohepa et al., 2004; Ministry of Health, 2008; World Health Organisation, 2004a). Overweight and obese children are likely to be obese into adulthood, and to have abnormal lipid profiles and high blood pressure at a younger age (Freedman, Hsu, Langefield, Rich, Herrington & Carr, 2005; Wiseman, 2008).

Concern for the levels of overweight and obesity is a global concern, the rates increasing at a fast rate in the last few decades (Giles-Corti & Donovan, 2003). In Europe, overweight is the 6th most important risk factor for ill health and premature death after tobacco, blood pressure and alcohol, cholesterol and insufficient physical activity. This is a world-wide phenomenon, nearly two-thirds of the population in the US and Brazil and one fifth of Chinese and over 6.8 million Canadians are considered overweight or obese (Anderson, 2008; Barnes et al., 2010). An increasing population rate of obesity among New Zealanders has been reported. In the 2006/07 survey by the New Zealand Ministry of Health, one in three New Zealand adults had a BMI in the normal range, however, one in three were overweight and a further one in four were obese. After adjusting for age, women were significantly more likely than men to have a BMI in the normal range, and men were more likely than women to be overweight or class I obese. The prevalence of obesity increased as age increased, until

a decline in men aged 65 years and over and in women aged 75 years and over, the highest prevalence of obesity being in men aged 55−64 years and women aged 55−74 years. The prevalence of obesity is prominent in non-Europeans, Pacific men and women were at least 2.5 times more likely to be obese, while Maori men and women were 1.7 times more likely to be obese, compared to men and women in the total population. In response to the need to address obesity and physical activity, the New Zealand Ministry of Health developed the New Zealand Health Strategy to address two of the top four health priorities for New Zealand. In Australia, the rates of overweight and obesity are also high, half of adult women and almost two-thirds of adult men classified as having high BMI scores, similar trends occurring in the United States and the United Kingdom (Giles-Corti & Donovan, 2003).

Obesogenic environments that promote excessive food consumption and discourage physical activity such as poor access to recreational facilities and infrastructure that discourages incidental activity, is said to have contributed to the rise in obesity (Bauman, Armstrong et al., 2003). The role of physical activity in relation to obesity recently has been recognised as being effective in the fight against the obesity epidemic (Bauman, Armstrong et al., 2003). Brisk walking of 30 minutes/day equates to 1.75 METS hours/day, similar to the level of energy imbalance associated with the current obesity epidemic (Matthews et al., 2008). No association has been found between being overweight and not meeting recommended daily physical activity requirements (Giles-Corti & Donovan, 2003). Although the role of physical activity is effective in maintaining a normal body weight, health promotion messages are not being absorbed by the total population resulting in the prevalence of obesity worldwide.

2.6.4 Diabetes mellitus

Diabetes is a metabolic condition which results in raised blood glucose, a condition that leads to high morbidity and mortality in New Zealand. Type 2 diabetes is expected to affect 300 million people worldwide in the next two decades (Allender et al., 2008). The presence of diabetes can lead to CVD, blindness, kidney disease and vascular insufficiency. These vascular problems may lead to nerve damage in the feet, or amputation of the lower leg (Allender et al., 2008). Modifiable risk factors for Type 2 diabetes are being overweight or obese and physical inactivity. According to the 2006/07 Ministry of Health survey, one in 20 New Zealanders (157,100 adults) has doctor-diagnosed diabetes (excluding diabetes during pregnancy). Men (4.7%) were slightly more likely than women (3.7%) to be diagnosed with diabetes when standardised for age and men aged 55−64 years were significantly

more likely than women in the same age group to have diagnosed diabetes. The prevalence of diagnosed diabetes increased with age in both men and women, one in seven adults aged 65 years and over had been diagnosed with diabetes. Compared to the total population, the prevalence of diagnosed diabetes was three times higher in pacific men and women and Asian men and women. Maori men and women were more likely to be diagnosed with diabetes than European New Zealanders, after adjustment for age. The number of adults who had been diagnosed with diabetes increased slightly (3.7% to 4.3%) from 1996/97 survey to the 2006/07 survey (Ministry of Health, 2008).

Improvements through diet and physical activity resulting in weight loss reduced the rate of the disease by 40%-60% over 3-4 years among high risk people were also observed (Warburton et al., 2006). Secondary prevention of type 2 diabetes includes the management of diabetes. A clinically and statistically significant reduction in glycosylated haemoglobin (0.66%) was observed in a meta-analysis of 14 controlled trials involving exercise interventions. Although studies show a strong association between physical activity and decreased rates of death from diabetes, the effects of dose (intensity and frequency of exercise) is yet to be determined (Warburton et al., 2006).

A theme among all studies on the various non-communicable diseases is that those who were previously physically inactive reduced the risk of ACM, making health promotion interventions targeting physical activity worthwhile. Although a central focus of health promotion includes non-vigorous physical activity, the expected benefits of various amounts of physical activity on all-cause mortality remain unclear (ACM). However, it is clear that a linear relationship occurs between physical activity and health status, increases in physical activity leading to further improvements in health status (Warburton et al., 2006).

2.7 FINANCIAL BURDEN ON THE HEALTH SYSTEM

Physical inactivity can contribute to large costs in health expenditure; a change in physical activity levels among the New Zealand population can significantly reduce the costs to the New Zealand health care system. Overweight and obesity has continued to rise in New Zealand (Anderson, 2008). Implications for costs to the health system and the economy will increase as this epidemic gains momentum (Giles-Corti & Donovan, 2003). The financial burden from obesity and physical inactivity in New Zealand is estimated to be NZD $303 million per annum in health care expenditure. It has

also been estimated that a 5% increase in physical activity levels could save NZD $25 million per year and NZD $160 million if every New Zealander became physically active to achieve health benefits (Hohepa et al., 2004). This population health problem is not limited to New Zealand, with similar implications for the health systems of other western countries. For example, in Australia, the health-related costs of obesity were estimated in 2003 to be $830 million, four percent of the total burden of disease being attributed to obesity and nearly seven percent to physical inactivity (Giles-Corti & Donovan, 2003). In the United States, nearly 0.3 million deaths annually are attributed to obesity. In England, the figures in 2003 were 30,000 deaths a year along with 18 million sick days, the estimated financial burden costing the economy billions each year (Giles-Corti & Donovan, 2003).

2.8 COSTS ASSOCIATED WITH PHYSICAL INACTIVITY

Healthcare costs are an everyday reality, workplaces experiencing an increase in health care costs along with a decrease in productivity, generating higher costs instead of savings to the workplace (Conn et al., 2009; Taylor, 2005). Lower healthcare costs are associated with increasing physical activity and adoption of healthy behaviours such as reducing smoking or alcohol consumption (Taylor, 2005). Workplaces are an important setting for reaching large numbers of working adults, particularly through health intervention programmes, providing economic benefits to employers among those improving fitness levels (Jacobson & Aldana, 2001; Yancey, McCarthy, Taylor, Merlo, Weber & Fielding, 2004). Cross-sectional studies consistently show increased health care costs and absenteeism rates among sedentary employees (Yancey et al., 2004). Furthermore, unhealthy workplaces have been shown to be associated with huge financial and human costs (Grawitch et al., 2006).

Increased physical activity levels were positively correlated in a study in Findland with employees' belief in the policy that employers should provide time for physical activity (Yancey et al., 2004). In a large US study on adult workers (N=79,070), weekly aerobic activity was compared with annual illness-related absenteeism. A significant relationship ($p < 0.05$) was found between no physical activity and absenteeism, one day of physical activity was associated with lower rates of absenteeism when compared with no physical activity. Two days of physical activity were shown to be more beneficial than one, the results suggesting a significant relationship between illness-related absenteeism and frequency of physical activity (Jacobson & Aldana, 2001). Workplaces involved in

health promotion experience reduced health care costs. A review of international studies reported a cost savings of $3.48 for every dollar spent. For health promotion programmes associated with savings from absenteeism related spending, the average cost-benefit ratio was 5.82 (Grawitch et al., 2006). In summary, incentives for workplaces to encourage physical activity among employees include reduced medical costs and avoiding lost income from employees taking sick leave.

3 HEALTH PROMOTION

Health promotion is defined as the process of enabling people to exert control over the determinants of their health and thereby improve their health, and changing social, economic and environmental conditions (Nutbeam, 1998; World Health Organisation, 1986). Health promotion provides individuals with the opportunities to participate, and to undertake activities either as individuals or as a partnership, such as in groups, to improve their physical, mental and social well-being. Empowering individuals, groups or communities to act collectively to take control over the determinants of health are valued outcomes. Parts of these valued outcomes include actions which support healthy lifestyles and create a supportive environment, strengthening the skills and abilities of individuals to take ownership of their health (Nutbeam, 1998; World Health Organisation, 1986). It is the responsibility of not only the health sector but a range of people and groups such as individuals, communities, researchers, workplaces, and education providers in participating in health promotion.

Providing and ensuring equal opportunities and resources to enable individuals to achieve their full health potential in achieving equity in health, is the focus of health promotion. This can be achieved by people taking responsibility for their health, making the most of opportunities to make healthy choice, however, this must be within a supportive environment with access to information on what healthy choices are. Achieving a high standard of health in the population cannot be ensured by the health sector alone. Health promotion requires coordinated action by all concerned: by governments, by health and other social and economic sectors, by nongovernmental and voluntary organisations, by local authorities, by industry and by the media. Health promotion involves health professionals and others concerned in promoting health, to reach out to people in all walks of life; as individuals, families and communities, in the pursuit of health. It is important that health promotion strategies and programmes be adapted to the local needs of individual countries and regions to take

into account differing social, cultural and economic systems (World Health Organisation, 1986), for example, the health needs of a country such as Africa could be very different to those of New Zealand.

Health promotion has evolved over the years, the Ottawa Charter for Health Promotion developed by WHO in 1986, introduced new strategies and methods to promote health, suggesting new methods of analysis and evaluating health promotion programmes (Nutbeam, 1998). Promoting the health message to the target population is a challenge for most health professionals; however, it is possible through such processes as social prompting. Bandura (1986) emphasises the role of emotion and choice in health behaviour compared to rational decision-making, the social cognitive approach to health behaviour (Nutbeam, 1998). The Health Belief Model (Rosenstock, 1974; Sheeran & Abraham, 1996) and the Exercise Behaviour Model (Noland & Feldman, 1984) describe the importance of social prompting. Social prompting influences the individual to choose a healthy behaviour in particular a message coming from a respectable person such as a health professional (Auweele, Boen, Schapendonk, & Dornez, 2005; Nutbeam, 1998). Health professionals and those working in areas of health promotion play a key role in informing others about the benefits of physical activity, and encouraging a supportive social and physical environment, which helps determine whether the person chooses the healthy behaviour or not and is enabled to make the necessary lifestyle changes.

3.1 THE SOCIAL ENVIRONMENT

A recent trend in health promotion is factoring aspects such as encouraging social support among individuals and promoting settings such as parks for undertaking physical activity, with planning policy changes to enable the social and physical environment to be more user-friendly. Changes in physical activity behaviour are short term in interventions focusing on individuals, a similar comparison between interventions focused on the physical environment show public health gains being minimal (Phongsavan et al., 2007). This suggests interventions focusing on self-efficacy and social support such as friends, family and work, may provide more long term benefits. Responding to this changing trend, recently, public health promotion has shifted from a focus on changing individual knowledge, attitudes and skills to changing social and physical environmental factors (Spence & Lee, 2000). Support from local government is important in encouraging and promoting

physical activity through physical and social environmental changes for example in urban settings, transportation, schools and workplaces (Phongsavan et al., 2007; Saris et al, 2003).

Strong positive associations have been found between physical activity and social support, using cross sectional and prospective study designs (Stahl, Rutten, Nutbeam, Bauman, Kannas & Abel, 2001). The majority of these studies have investigated the relationship between vigorous physical activity and social support, however this pattern is changing with, more recently, studies examining moderate physical activity and social support (Sallis & Owen, 1999). In a cross-cultural study designed to measure the extent of development of supportive policies for health promotion in European countries including Belgium, Finland, Germany, The Netherlands, Spain and Switzerland, the study found individuals were 77% more likely to be inactive due to lack of information about programmes and actions compared to those well informed (Stahl et al., 2001). The social environment was strongly associated with being physically active; those perceiving low levels of social support from family, friends and the workplace were twice as likely to be physically inactive compared to those from a supportive personal environment. Previous research between social support and physical activity supports this finding, suggesting increased focus on social norms surrounding active lifestyles, and increasing "socially acceptable" behaviour is required in order to promote increased participation in physical activity (Stahl et al., 2001). One recommendation given is that practical and specific knowledge on programmes and actions surrounding sport and physical activity is needed as opposed to the health risks and benefits of physical activity (Stahl et al., 2001). The relationship between social support and physical activity is important for women, to the extent that women prefer to undertake physical activity with company compared to on their own.

3.1.1 Leisure time physical activity in women

Studies have consistently reported lower rates of physical activity for females than males, indicating recruitment of women to participate in a physical activity intervention to be a priority, particularly for New Zealand and Australia. An understanding of the potential health benefits of physical activity in women and possible barriers to participation for women is gaining momentum. Women are less likely than men to meet physical activity recommendations, unequal access to active leisure time reported as a possible barrier (Wenn, Bindon & Rissel, 2005). In the most recent health statistics collected by the Ministry of Health in New Zealand for 2006/07, women were underrepresented in participating in physical activity. The greatest difference between men and women occurred in the 15–24 year age group, where men were nearly 1.5 times as likely as women to do at least 30

minutes of physical activity a day on five or more days of the week. Regular physical activity declined in the over 65 year age group for women and in the over 75 year group for men. Men aged 75 years and over were also much more likely to report regular physical activity than women of the same age (Ministry of Health, 2008).

Participation levels in Australian women follow a similar trend; the findings from a study confirming women, compared to men, participating in low levels of physical activity (Wenn et al., 2005). Several studies have tried to explore possible reasons for lower female participation in physical activity, possible reasons given for low participation of women including being "too tired" and insufficient time to participate in physical activity (Brown, Mishra, Lee, & Bauman, 2000). Although the findings were adjusted for other risk factors and socio-demographic variables, the study was limited to establishing a cross-sectional association rather than a true causal relationship. Strengths of the study include an understanding of the potential health benefits of physical activity in women beyond current studies that investigate mortality or CVD (Brown et al., 2000).

Many of the women in another Australian study report a number of benefits gained from participating in physical activity, both psychological and physiological. Increase in confidence and viewing activity as 'time out' and a social outlet, enabled the women to cope better in life as a result of being physically active (Wenn et al., 2005). Physiological benefits experienced by the women in the study include weight loss, increased energy levels, improved sleeping patterns and feeling younger. Some of the barriers for women undertaking physical activity included lack of support, environmental/safety factors, and managing and prioritising time; these factors falling within the themes of the role of motherhood. Decreased feelings of stress, having more energy, coping with the demands of daily living and feeling younger were the most common short-term benefits reported. The short term benefits were more attractive than the long term benefits, as the long term health benefits of an active lifestyle were not the reasons why the women participated in physical activity campaigns (Wenn et al., 2005). Promoting health promotion programmes encouraging physical activity for women is considered important due to the lower levels of participation among women.

3.1.2 Social support and physical activity among women

The findings from a cross-sectional study using a physical activity survey carried out in 1996 by researchers in the state of New South Wales, Australia, to examine participation in physical activity

during leisure time and at work for 3,392 adults, found walking with company to have a significant association with the likelihood of walking for physical activity. Participants reporting no company and no pet to walk with compared to those with company were 31% less likely to go for a walk in the past two weeks, controlling for gender, age and education. There was a significant finding between gender and company, the association between company and walking for physical activity increased for women (Ball, Bauman, Leslie, & Owen, 2001). Results from an international study by Ståhl et al. (2001) examining associations between physical activity and social support are consistent with these findings.

In a later study by Giles-Corti & Donovan (2003) those who had company, particularly four or more people, achieved recommended levels of physical activity, compared to individuals participating on their own. Respondents who owned a dog were 58% more likely of being physically active and had a decreased risk of CVD; although in the study they failed to meet recommended levels, suggesting a strategy is needed for encouraging dog owners to undertake increased physical activity (Gile-Corti & Donovan, 2003; Ministry of Health, 2008). Competing for time and battling tiredness seems to be a major deterrent for females compared to males when it comes to participating in physical activity. With an increase in women taking up professional roles such as managerial positions in the workplace, according to the Department of Labour (2010), these determinants become more of a barrier to participation in physical activity as these roles require a lot of time and energy. It has been shown from this research that the social group is valuable and important for women, influencing women more than men to participate in physical activity or not. The workplace, especially those in the health and education sector, is an ideal setting for women to join colleagues for a walk during the lunch break, although, small workplaces are limited for choice in numbers due to small workplaces consisting of less than 20 employees. Other factors contributing to whether physical activity is undertaken or not relate to the physical environment, whether easy access to settings such as parks is easily accessible or not.

3.2 THE PHYSICAL ENVIRONMENT

The physical environment continues to influence whether people walk at recommended levels or not, influencing people's health and outcomes associated with the physical environment in which they live in. Encouraging communities to be active is becoming more recognised; particularly through urban planning of buildings and communities, transport, and road networks (Giles-Cort &

Donovan, 2003). In recent years, studies investigating the role of the physical environment in physical activity have increased, stemming from the shift in emphasis from intra-individual and biological factors to the interaction between individuals and the environment. However, no published studies investigating the relationships between psychosocial and environmental factors in relation to physical activity, in New Zealand have been reported (Phongsavan et al., 2007). One Scottish study reported a significant relationship between access to public open spaces and perceptions of the physical environment and self-reported walking behaviour. Results found those living in a street with high traffic usage and no trees were 50% less likely to achieve recommended levels, 25% for those who had no footpath and shops (Giles-Corti & Donovan, 2003). Local streets have been identified as the most common place for engaging in physical activity, high traffic usage on roads will impact on whether physical activity is undertaken in the local area or not (Giles-Corti & Donovan, 2003). Although the physical environment may on the surface look to have minimal influence on whether people undertake physical activity or not, all of these factors contribute in some way to the obesity epidemic occurring in western countries.

3.2.1 The physical environment and motorised transport

A large proportion of the New Zealand population rely on motorised transport for daily travel due to increased urbanisation (Badland & Schofield, 2005). However, the replacement of physical activity by motorised transport is becoming increasingly common, contributing a to sedentary lifestyle and inactivity, and having a role in the obesity epidemic (Wen, Hawkley, & Cacioppo, 2006). The physical environment where people live and work influences their overall travel choices, affecting the time spent walking or biking as a means of transport (Stephenson, Bauman, Armstrong & Bellow, 2000).

This problem has been reported in many countries world-wide including the US, China and Switzerland. A US study reported an association between motorised transport and obesity, findings include for every one hour spent in a car there is an associated 6% increase in the likelihood of obesity (Bell, Ge & Popkin, 2002; Frank, Andresen & Schmid, 2004; Dombois, Braun-Fahrländer & Martin-Diener, 2007). A study involving a cohort of Chinese adults over 8 years reported those who obtained a vehicle during the time of follow-up were at an increased risk of becoming obese (Bell et al., 2001; Dombois et al., 2007). Results from the Swiss Health Survey in 2002 showed 64% of the Swiss adult population did not meet recommended levels of physical activity due to replacing physical activity with driving a vehicle (Stamm & Lamprecht, 2005; Dombois et al., 2007). Overall, positive benefits can be gained from walking for transport such as reducing automobile dependency

and the opportunity to strive for a healthier, greener and safer community (Giles-Corti & Donovan, 2003).

In summary, the environment can contain incentives or restrictions that make healthy behaviour easier or less easy to implement into everyday life (Stahl et al., 2001). For example office-based workplaces can provide an attractive sedentary environment which is restrictive in nature, while in comparison, other environments provide incentives include facilities for physical activity such as bike paths. Regulations and policies surrounding these areas are strongly related to promoting or restricting physically active behaviour (Stahl et al., 2001). Reducing exposure to health risks, and promoting healthy behaviour need to be addressed at a societal level to create changes in the environment. Environmental interventions do not require people to take action individually, or to make active behavioural changes as it is considered a 'passive' intervention. Environmental interventions however, do bring positive benefits regardless of gender, income group, and socio-economic status (Stahl et al., 2001).

3.3 HEALTH PROMOTION INTERVENTIONS

Health promotion interventions vary depending on the target population and setting, for example, active transport, walking based interventions, stair use and those specifically targeting men or women. It is a challenge for health professionals implementing workplace health interventions that include population groups which are hard to reach, for example, women, Maori and Pacific Islanders and those physically inactive. Health interventions involving participation from Maori, Pacific Island, Asians and Europeans, provides all New Zealanders with the opportunity to be physically active together.

Continued migration to New Zealand indicates the importance of programmes being inclusive, to all cultures. Programmes in the past, consistently report an unequal representation from all cultures and gender, until recently, as most physical activity programmes in the workplace have consisted of white males as opposed to women (Pohjonen & Ranta, 2001). This was a concern to health professionals as women have been associated with habitual low physical activity (Dishman, Oldenburg, O'Neal & Shephard, 1998; Mutrie & Choi, 2000). New Zealand's increasing ethnic and cultural diversity has important implications for health promotion. New Zealand is home to a large number of Pacific people, many having migrated from the Pacific Islands to Auckland, New Zealand

since the 1920s, Auckland considered as the largest Polynesian city in the world. The health risks associated with Pacific Island people are considerably higher compared to non-Maori New Zealanders, including, an increase risk of coronary heart disease (CHD), and type 2 diabetes. Health risks are likely to increase due to continued immigration, the ageing of the population and population growth over the next two decades (Bell, Swinburn, Amosa, & Scragg, 2001).

Interventions for Pacific people have proven to be successful, such as the study by Bell et al. (2001), which reported a 10% increase in the number of those vigorously active compared to those in the control group. This study has shown that programmes among populations hard to reach are attractive to this population, however, not every region in New Zealand is able to implement a health promotion programme on a small scale, enabling programmes to cater for individual needs within the group. Although there are many different interventions health promoters can implement, those considered to be the most popular include active transport, walking as an intervention and stair prompts which are outlined below.

3.3.1 Active transport

Studies on active transport have been proven to be successful in increasing the use of active transport, replacing motorised transport and leading to increased levels of physical activity. A key study in New South Wales highlighted the role transport had in relation to physical activity, reporting people who drove to work were less likely to achieve recommended levels of physical activity compared to non car users. The study reported a significant reduction in the number of staff (20%) using motorised transport to work over 5 days per week (Wenn et al., 2005). A change in attitude towards active transport across the whole population would result in a decrease in overall car use, making a significant contribution to the health of the working population (Wenn et al., 2005). Limitations of the study include the study being a pilot study carried out in a workplace for health employees who were more likely to follow health promotion messages, possibly leading to bias, due to these employees maybe more aware of health issues than the population in general (Wenn et al., 2005). The sample consisted of mainly women and no systematic studies of active transport across the population have been implemented, questioning whether the results from the study are typical, and the study did not have a control group. Despite these limitations, the study suggests the workplace is an ideal setting for promoting and increasing physical activity through the use of active transport (Wenn et al., 2005).

3.3.2 Walking as an intervention

A dose-response relationship between walking and CVD and all-cause mortality (ACM) indicates the importance of walking. Decades of epidemiological evidence have concluded that physical inactivity was considered a disease risk factor along with smoking and poor diet (Badland & Schofield, 2005; Giles-Corti & Donovan, 2003). The US Surgeon General's report on physical activity brought a fresh outlook to the benefits gained from moderate physical activity, including brisk walking which was put on the public health agenda in 1996. A health promotion intervention involving walking has the potential to impact to the wider population, and many studies have focused on walking and the impacts on a population as a result. Walking is the most common and preferred form of physical activity for the general population and among sedentary individuals taking up physical activity, and is popular for both gender, particularly for women and people over 50 years (Badland & Schofield, 2005; Giles-Corti & Donovan, 2003). The accessibility, equipment-free, and acceptability makes walking an attractive form of physical activity (Siegel et al., 1995). Walking is a low-cost activity which can easily be implemented in the workplace, for example, during the lunch time break.

The overall picture of the effect of walking is limited due to earlier epidemiological work on general leisure time physical activity or energy expenditure being examined, and not specific activities such as walking. Systematic studies on the association between walking and chronic disease are unknown, and the size and dose-response relationship between walking and more vigorous activities is unclear. Meta-analyses on controlled trials for walking and blood pressure have shown walking to be beneficial (Hamer & Chida, 2007; Murphy, Nevill, Murtagh, & Holder, 2007). The recent meta-analysis of randomised controlled trials by Murphy et al. (2007) found no linear dose-response relationship between walking volume and cardiovascular risks factors, however, evidence for this relationship was found in the most recent meta-analysis by Hamer & Chida (2007). Limitations of the meta-analysis by Murphy et al. (2007), include inconsistency with collection and presentation of detailed measures of self-reported walking. Exclusion of studies which presented total physical activity and not specific activity types may potentially influence the final results (Hamer & Chida, 2007). The review included 13 studies examining CVD and 10 studies exploring ACM, both genders were represented in only five of the studies (Hamer & Chida, 2007). Results show an increase in aerobic capacity and a reduction in adiposity and diastolic blood pressure in previously sedentary adults as a result of walking interventions which averaged more than 5.2 hours per week (17.2km per week). Walking pace measured as a "relative" as opposed to "absolute", the average walking

time/distance for meeting the minimum requirements by the US General Surgeon was approximately 3 hours per week (9.8km per week), (Hamer & Chida, 2007).

Further results report associations between lower waking levels and cardiovascular prevention to be statistically significant, for walking at least 2.5 hours per week of moderate intensity activity. The dose-response effect illustrates the higher walking volume/intensity the stronger the effects. Increased effects were demonstrated through brisk walking for positive effects on CVD and ACM, however, moderate pace walking also showed a dose-response effect (Hamer & Chida, 2007). Limitations occur when adjusting for potential confounders such as adiposity and other physical activities which were not consistent across the studies, however, mostly all studies made adjustments for age, smoking and alcohol. No differences were observed for gender; however, walking volume (time and distance) was not as accurate/strong compared to self-reported walking pace (intensity).

Unfortunately, short term interventions involving walking are not as effective as long term interventions, shown in the study by Bassey, Patrick, Irving, Blecher and Fentem (1983). Factory workers (n=580), participated in an unsupervised walking programme over 12 weeks, 5 times per week, 20-40 minutes with a follow-up at 24 weeks. Outcome measures including physical activity and fitness indicate an adherence rate of one third achieving the prescribed protocol; however, no significant effects were found (Bassey et al., 1983). Although moderate intensity activities produce some benefits, some studies have argued that only activities involving vigorous intensity are associated with reduced risk. Two of the largest cohorts in women so far reported vigorous activities not showing an increase in protection compared to walking (Hamer & Chida, 2007). To reflect the benefits to health that moderate and vigorous activities produce, the guidelines by the US Surgeon General suggest that combinations of vigorous and moderate intensity are beneficial (World Health Organisation, 2004a).

3.3.3 Stair prompts

Stair use in workplaces have been shown to be very user-friendly, inexpensive and worthwhile, however, they do have some limitations, for example, the long term effects stair use has on health and well-being of employees is unknown. Studies evaluating the impact of stair use on health are shown to be effective, for example, reduced mortality in some populations (Auweele et al., 2005; Boreham, Wallace, & Nevill, 2000). Barriers to participation in physical activity, such as, financial

costs, location, poor weather and a sense of embarrassment, are commonplace especially amongst women. Promoting stair use is an efficient way to increase physical activity and improve the health of sedentary people, as it is low-cost, easily accessible and located indoors (Auweele et al., 2005).

The extent of the observed effects being generalised to a setting such as the workplace, where employers have to pass by the sign several times a day is unknown. However, interventions at workplaces promoting stair use through use of signs have proven to be successful, employees in one study increasing from 62% at baseline to 67% during the intervention (Auweele et al., 2005). In the study by Auweele et al. (2005), two forms of interventions, a traditional health sign to encourage stair use and email by the workplace doctor were used. During the study, stair use increased by 8% up to 85% following an email by a physician, in line with the social cognitive perspective on health behaviour Auweele et al. (2005). The study by Auweele et al. (2005) found placing health signs in front of lifts and physicians promoting stair use through an email, contributed to the workplace increasing physical activity of their employees. However, permanent signs and regular emails from a health professional are important for sustaining the increase in physical activity. Physical activity was higher at the end of the study than at baseline, however, results showed the effects of the intervention disappearing completely after one month. The long-term effects and health benefits of stair sign interventions in workplaces are yet to be observed Auweele et al. (2005). Two earlier studies report positive results as stair use increased above baseline after removal of signs in studies by Blamey, Mutrie, & Tom, (1995) and Brownell, Stunkard, & Albaum, (1980). However, a later study reported no significant increase in stair use in the study by (Marshall, 2004) although a decline, not much different from baseline (85% to 65%), was observed in follow-up observations (Marshall, 2004). Overall, employees taking the stairs instead of the lift will still produce some benefits, for example, increasing VO2 Max, and step count, increasing energy expenditure compared to walking on flat ground or taking the lift. Each workplace has its different needs, the health promotion programmes will vary depending on the characteristics of the needs of the population within each workplace. Some programmes may have to be generalised to cater for the many different types of workplaces, for reasons such as limited time, funding, and resources available.

3.4 HEALTH PROMOTION IN THE WORKPLACE

An important issue for workplaces is the concern for health and well-being of their workers. Corporate, health and cultural factors have added to the emergence of workplace based health promotion, leading to an increase in number of workplaces introducing health promotion or 'wellness' programmes. Workplace health promotion refers to activities aimed at improving the health and reducing risk factors in employees. Previously, the goal of workplace health towards employees did not focus on optimising health but rather on avoiding being unhealthy. In the 1940s, workplaces provided their employees with the chance to attend outings and picnics, this changing to workplaces providing fitness programmes for workers in the 1970s and 1980s (Grawitch et al., 2006).

Health promotion programmes are becoming more common worldwide; approximately two-thirds of all private workplaces with 50 or more employees' are offering such programmes, benefitting both the workplace and employees' (Conrad, 1988a; Grawitch et al., 2006). Workplaces, particularly in the United States, have traditionally provided disability and insurance packages and employee assistance programmes (Conrad, 1988a). Larger workplaces are more likely to offer health promotion with major American companies such as Johnson & Johnson, IBM, Pepsico and the Ford Motor Company. Countries in Europe do not offer as wide a range of programmes, restricting them mainly to cardiovascular risk reduction programmes, Japan offering some fitness programmes with no major interest in health (Conrad, 1988b).

The settings for workplace health promotion programmes include both workplace and community settings. Participation is usually voluntary and may or may not include costs to the employee; either during work time or outside of work time, however they are usually sponsored by the employer (Conrad, 1988b; Fielding, 1990). Some programmes may be available to every employee or some groups within the workplace; either for a short period of time or on a continuous basis. Participation rates are more popular for onsite programmes (20-40%) compared to offsite programmes (10-20%) (Conrad, 1988b). Currently, interventions offered by workplaces include a combination of educational, workplace and environmental activities, and comprehensive health and physical activity programmes, for example health education, screening and intervention, and stress management (Conrad, 1988a).

The U.S Surgeon General's Report on smoking which linked the development of lung cancer from cigarette smoking was one of many important revelations in lifestyle-risk factors being behavioural

and therefore modifiable. Such information highlights the scientific justification for health promotion. Besides scientific advances, cultural attitudes toward wellness are also another reason for increased health promotion within workplaces. An increasing proportion of people, particularly Americans, are showing interest and participation in fitness and wellness, not due to any breakthroughs in medical research, but from an increased awareness of health and well-being depicted by the media and the commercial marketing of health products (Conrad, 1988b).

3.4.1 Potentials and pitfalls

There are potentials and pitfalls in health promotion that are known to influence certain outcomes. An understanding of what is needed in order to achieve a healthy workplace has been developed from the various disciplines including psychology, public health, sociology, medicine and economics (Grawitch et al., 2006). The advantages to a healthy workplace include improvements in employees' health leading to decreasing medical and disability costs. Significant decreases in insurance claims have also occurred among workplaces that have made a commitment to implementing health promotion programmes within the workplace (Conrad, 1988b). Workplaces' are placed at a competitive advantage from having healthy workplace programmes, including, boosting employee morale and the attraction and retention of employees (Grawitch et al., 2006). Health promotion programmes in general can run at very low-costs to both the employer and employees and at the same time producing cost-effective benefits (Conrad, 1988b).

The pitfalls in workplace health promotion include health promoters and researchers having limited knowledge and oversight in how to change people's habits, for example smoking. Health literacy is valuable in educating people on the health risks associated with lifestyle behaviours, such as smoking can lead to lung cancer; however health literacy alone is not sufficient. Some evidence suggests that those signing up for workplace interventions may already be healthy and physically active. A challenge for health promotion programmes is the aspect of attracting those considered as 'high risk' employees (Conrad, 1988b).

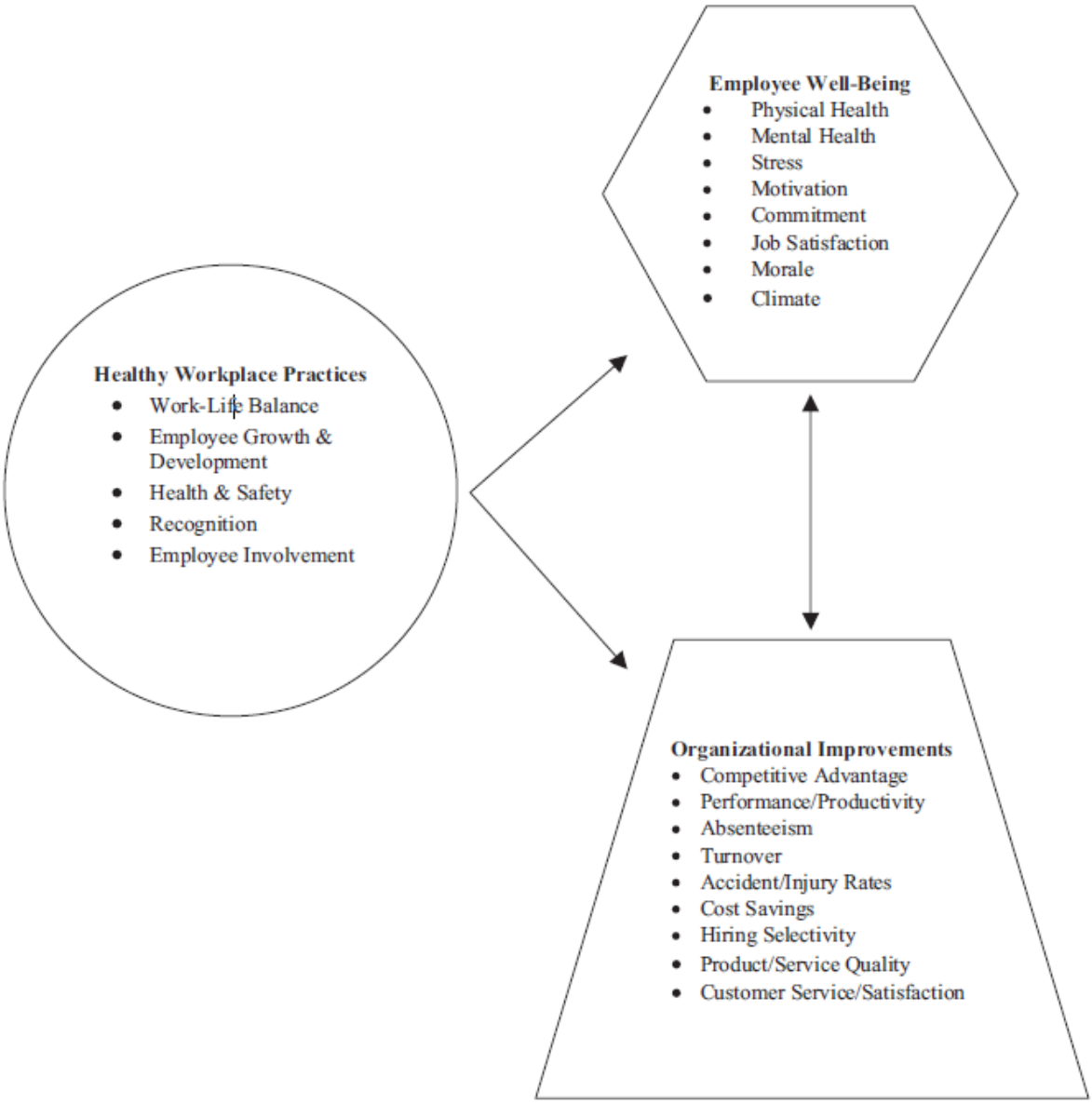
3.5 HEALTHY WORKPLACE

The advantage of a healthy workplace is becoming well-known. The aim of workplace wellness interventions are to promote employee health and reduce workplace health care costs by facilitating the health of employees and their families through supporting lifestyle and behaviour changes

(Conrad, 1988b; Danna & Griffin, 1999). This differs from the traditional workplace programmes which focused on health protection, for example promoting safe working conditions (Conrad, 1988b). Research examining the relationship between employee well-being and workplace has lead to a better understanding and increased awareness. Although there is no one definition on the most appropriate indicators of employee well-being, some indicators are physical, mental, and emotional aspects of employee health which impact on employees in a intricate way (Grawitch et al., 2006). By taking a holistic approach, workplace outcomes such as health care costs and absenteeism rates may be improved. It is recommended by researchers in the field of workplace support that employee well-being and workplace improvements are considered simultaneously and receive attention continuously (Conrad, 1987; Danna & Griffin, 1999; Grawitch et al., 2006; Rhoades & Eisenberger, 2002).

A review of the literature from 1990 onwards identified five common themes as being healthy work practices. These include work-life balance, employee growth and development, health and safety, recognition, and employee involvement (Grawitch et al., 2006; Rhoades & Eisenberger, 2002). These practices are known to play a significant role in job satisfaction and stress, however, when absent increased stress is experienced by employees as a result (Grawitch et al., 2006). Work life balance is incorporated with the workplace by the provision of giving the employees the flexibility to maintain a balance between work and family, for example, providing childcare, flexible timetables or job security. Through giving employees the opportunity to add to their existing skills, knowledge and experiences, an increase in motivation in employees may result, promoting employee growth and development. Training and career opportunities within the workplace could add to employees job satisfaction and have positive results on the effectiveness of the workplace (Grawitch et al., 2006; Rhoades & Eisenberger, 2002). Depending on the preferences of the workplace, recognition can come in many different forms. Health and safety has been defined in terms of health care costs and illness-related absenteeism. The well-being of employees is maximised through health and safety by preventing, assessing and treating possible health risks and problems (Aldana & Pronk, 2001; Grawitch et al., 2006). Some practices recognise the efforts put in by their employees by providing monetary and award ceremonies. The PATH model depicting the path to a healthy workplace is given below for outlining what constitutes health workplace practices (see Figure 1, p. 41).

Figure 1 The PATH model



To encourage participation from employees, some workplaces provide incentives such as cash or spot prizes, particularly if the workplace is trying to reach 'high risk' employees, for example, those likely to be physically inactive (Conrad, 1988b). In a survey of American employees, 70.6% report favouring workplaces to provide the opportunity for employees to participate in physical activity during the workday. Utilising the work breaks are considered to be an ideal opportunity for health promotion, "booster breaks" used for promoting healthy behaviours such as walking instead of unhealthy behaviours such as smoking and coffee drinking (Taylor, 2005).

3.6 THE EFFECTIVENESS OF WORKPLACE INTERVENTIONS

3.6.1 Evidence of the effects on physical fitness and health

Workplace interventions produced positive effects on increased physical activity levels and decreased musculoskeletal disorders, along with increased self-esteem and quality of life. The workplace is an effective setting for promoting positive population changes towards physical activity due to a large number of adults employed outside the home. Employees' on average spend eight hours a day at their workplace (Blair et al., 1986; Conn et al., 2009; Conrad, 1988b). Although many studies have assessed the effectiveness of workplace physical activity programmes, systematic reviews of the effectiveness of workplace physical activity programmes on health-related benefits are lacking (Blair et al., 1986; Proper et al., 2003).

A critical review of the literature provided a range of findings (Proper et al., 2003). The study covered published studies between 1980 and 2000, four categories for selection criteria including the following: 1) randomised controlled trial or nonrandomised, controlled trial; 2) working population; 3) workplace intervention programme to promote employees' physical activity or physical fitness; and 4) physical activity, physical fitness, or health-related outcomes (Proper et al., 2003). Inconclusive or no evidence was found for a positive effect for studies on physical fitness, general health, blood serum lipids, and blood pressure. Workplace physical activity interventions on physical activity and musculoskeletal disorders provided strong evidence for a positive effect, however, limited evidence was found for a positive effect on fatigue. The conclusions from the critical review show workplace physical activity initiatives lead to an increase in physical activity levels and a decrease in the risk of musculoskeletal disorders (Proper et al., 2003).

A comprehensive meta-analysis, from the years 1969 through to 2007, of workplace physical activity interventions reports an improvement in health and workplace outcomes (Conn et al., 2009). Previous quantitative studies did not address health, well-being, or work-related outcomes of improved physical activity. Although most did not report on company size, those that did consisted of mainly large workplaces (at least 750 employees). Only five described as small (less than 100 employees), mainly in the education or health services, government and manufacturing areas. No effect was reported for company size. The majority of interventions did not occur during employees' paid work time compared to non-paid work time; however, those that did, larger mean effect sizes were reported compared to outside of company time. Some studies involved interventions being

designed by employees, those delivered at the workplace had a larger mean effect size compared to those delivered elsewhere. Some workplaces provided fitness facilities, supervised physical activity or motivational or educational sessions to be used in the intervention (Conn et al., 2009). Absenteeism levels were lower and job stress was significantly lower than control subjects at follow up, however, the findings are limited due to a small number of studies reporting these variables.

3.6.2 Increased well-being and self-esteem among employees

Previous studies showing associations between physical activity and employee well-being indicate a need for physical activity programmes within the workplace. Employees' experiences at work can also potentially cross-over into other areas outside of working life, making well-being an important aspect to health promotion (Dishman, Oldenburg, O'Neal & Shephard, 1998; Thogersen-Ntoumani, Kenneth, & Ntoumanis, 2005). Participation in physical activity has a positive effect on the workplace and the employees themselves, supported by previous empirical studies by Daley & Parfitt, (1996) and a cross-sectional study by Thogersen-Ntoumani et al. (2005), measuring three components of mental well being (physical self, work-related and global) amongst 312 corporate employees. The two studies indicated increased enthusiasm at work and increased well-being amongst physically active employees.

The study by Thogersen-Ntoumani et al. (2005), supports Sonstroem & Morgan, (1989) Exercise and Self-Esteem Model arguing small increases in global self-esteem result from physical activity. High self-esteem is recognised as important due to minimising the effects of stress through physically active people being more resistant to stress-related illnesses and absenteeism (Thogersen-Ntoumani et al., 2005). The success of workplaces through improved job performance is also a result from increased employee self-esteem (Judge & Bono, 2001; Thogersen-Ntoumani et al., 2005). Previous studies investigating physical activity and job satisfaction have found positive significant relationships; however, reasons for this relationship have not been given. Enthusiasm at work has been found to be a possible factor between physical activity and job satisfaction, positive effects identified as one of the most important predictors of job satisfaction, physical activity enhancing this effect (Thogersen-Ntoumani et al., 2005). Employees' perception of life satisfaction is indirectly related to physical activity, supporting the idea that physical activity interventions at work may increase employees directly to feel more satisfied at work, as happier employees are less likely to be absent from work and have increased motivation to work (Aldana & Pronk, 2001; Thogersen-Ntoumani et al., 2005).

The foregoing research indicates that health promotion programmes in the workplace can be effective and can promote positive population changes towards increased physical activity, as an ideal place to encourage physical activity due to a large number of adults employed outside the home (Blair et al., 1986). Despite the workplace being a convenient location, attracting employees into workplace programmes is a challenge. Participation rates from employees are reported to be very low in workplace health promotion programmes, 15% or lower of employees taking part (Fielding, 1990). Studies have previously attempted to identify employees who are most likely to participate in a workplace health promotion programme; however, results are inconsistent and inconclusive to predisposing health risk and socio demographic characteristics. Possible reasons to explain the findings include significant differences in programmes, participation levels, health promotion activities, definitions of participation and socio-demographic and health risk prevalence difference (Fielding, 1990).

Every workplace is different in regards to workplace size, the health needs of the employees, and work hours, for example, shift work or overtime hours. Finding the 'best fit' and the costs for running the programmes is difficult. Despite these possible barriers, many workplaces implement some form of intervention to encourage physical activity among their employees.

3.7 WORKPLACE INTERVENTIONS IN NEW ZEALAND

The success associated with workplace programmes indicates that there is a need for further health promotion programmes within the workplace. Physical activity interventions, particularly among community groups and through sports organisations, are becoming more prevalent in New Zealand. Many published studies on workplace health promotion are available internationally, however, a review of the current literature on workplace physical activity interventions in New Zealand is lacking. To date, little objective measurement of workplace physical activity within New Zealand have been reported, despite reporting positive results from studies on physical activity interventions within the workplace (Blair et al., 1986; Proper et al., 2003; Thogersen-Ntoumani et al., 2005). The use of self-report is more common; however, this is not without limitations (Proper et al, 2003. Differences in accuracy have been reported when measuring vigorous physical activity, self-report data showing lower levels of vigorous activity compared to direct methods. Possible reasons for the differences include problems with participant level of understanding and recall (Prince,

Adamo, Hamel, Hardt, Gorber & Tremblay, 2008). Workplaces in New Zealand can be an ideal place for health promotion as for many New Zealanders the workplace is where they spend a lot of their day, enabling workplace programmes the potential to reach a large proportion of the population. This could possibly reduce health costs and increase employee morale, productivity and the workplace image (Price, Mackay, & Swinburn, 2000).

An example of a successful workplace programme in New Zealand is the Heartbeat Challenge programme implemented by the National Heart Foundation of New Zealand in 1992, developed for workplaces in response to following current trends of a workplace programme with a more comprehensive approach as opposed to a singular workplace intervention (Price, 2000). The aim of the Heartbeat Challenge is to create an environment that supports and improves health and empowers individuals to make healthy changes. To assist in changing the workplace environment to a health-promoting setting, all people within the workplaces were encouraged to be involved including senior management, human resources and employees. One hundred and fifty-nine workplaces participated, with a variety of types of workplaces registering for the challenge, mostly from the industrial and commercial sectors (54%), along with schools, government agencies, hospitals, university, retail and health/recreation centres. The Heartbeat Challenge was considered a success, employees feeling more positive about the company and themselves. Eighty-nine percent of workplaces reported staff feeling comfortable within the workplace environment, 73% agreed that employees had a positive feeling about the workplace, and 82% of the workplaces reported employees having a more positive image about them (Price, 2000). The evidence from the New Zealand Heartbeat Challenge is that workplace health promotion can be effective in New Zealand workplaces. A healthy workplace environment leads to healthier behaviours.

3.8 SUMMARY AND CONCLUSION

The Literature Review identified a gap in existing research, in that there is ample evidence of measurements taken from employees, (e.g. blood pressure, body mass index), to assess individuals' health and well-being, however, little was known about the level of support for health promotion programmes based in the workplace. The importance of the health and well-being of employees has been emphasised in the literature. These aspects, if addressed, can lead to improved health outcomes for employees, such as increased job satisfaction and increased motivation to work. Economic benefits to employers included reduce workplace health care costs and absenteeism rates (Aldana & Pronk, 2001; Jacobson & Aldana, 2001; Thogersen-Ntoumani et al., 2005; Yancey et al., 2004). It has been suggested that these aspects should be considered simultaneously and receive attention continuously to achieve optimal workplace support (Conrad, 1987; Danna & Griffin, 1999; Grawitch et al., 2006; Rhoades & Eisenberger, 2002).

Workplaces may gain a competitive advantage from having healthy workplace programmes in place, and workplaces are considered an important setting for reaching large numbers of working adults (Grawitch et al., 2006; Jacobson & Aldana, 2001; Yancey et al., 2004). The workplace is also an ideal location to promote physical activity due to the limited cost and time commitment required for both employees and employers to implement programmes. Little is known about the dose-response relationship between workplace support and physical activity, and this gap in the literature provided the basis for this study: the evaluation of a New Zealand based health promotion programme called the 'Sea 2 Sea Challenge' organised by Sport Canterbury, involving workplaces in the Christchurch region, New Zealand.

4 METHOD

This chapter will provide the details of the research strategy adopted to address the research aims and objectives, together with the means of collecting data for analysis, including sample selection and the analysis approach to be adopted.

4.1 INTRODUCTION

This research study is set within the context of workplace physical activity and has four main objectives. The aims and objectives having been outlined in the Introduction section, Chapter 1. A valuable aspect of this research work relates to Objective 3 and 4 to "establish the level of individual participation in Sea 2 Sea for each participating workplace and "establish the level of support by workplace coordinators to encourage participation from employees in the workplace." Two groups were included in this study, individual participants associated with a workplace; and workplace coordinators who registered their workplace for the Sea 2 Sea Challenge. Two forms of data collection were utilised; the self-report physical activity chart, and the workplace coordinator questionnaire.

4.2 RESEARCH PURPOSE

The purpose of this research is to investigate the relationship between workplace participation in, and support for, a physical activity initiative and the physical activity outcomes obtained by the individual participants of those workplaces.

4.3 ETHICAL CONSIDERATION

Approval for the study was granted by the University of Canterbury Human Ethics Committee and the Health Sciences Centre. An outline of the study was given to all workplace coordinators in the introductory letter from the researcher. Contact information regarding any questions participants may have had about the study was also provided. Completion of the questionnaire indicated consent to contribute to this study (see Appendix A, p. 116).

4.4 RESEARCH DESIGN

This is a quantitative study based on self-report physical activity charts completed by Sea 2 Sea participants and a survey completed by workplace coordinators. Quantitative, as Biggam, (2008) states, refers to research that relates to quantities and measurements; for example, in this study, the measurement of minutes of physical activity for individuals and workplace participation and support for the Sea 2 Sea Challenge. Quantitative research designs, as outlined by Hopkins (2000) can be either descriptive (subjects usually measured once), or experimental (subjects measured before and after a treatment).

Due to time constraints, the participants in this study were measured only once, following a cross-sectional study design. Cross-sectional study is defined by Aron & Aron (2003) as a non-experimental research design that looks at data at one point in time. In this study, individual physical activity levels and workplace coordinator support of the study population were measured at one particular time. Data available from participants were limited by the design of the self-report physical activity charts and collection of these by Sport Canterbury prior to this study. A questionnaire, designed by the researcher, was sent to all workplace coordinators after the 2007 Sea 2 Sea Challenge.

A questionnaire was used to collect data from the survey participants, for example the workplace coordinators, for the purpose of examining the characteristics, opinions and behaviour of the population. Questionnaires are a widely accepted vehicle for obtaining information of a statistical nature in a useful summary form (Statistics New Zealand, 1995). A factor analytical approach was taken to obtain results from the data, which were collected in the questionnaire. The factor analytical approach provides the researcher with information about the extent to which items measure the same underlying concept. (Aron & Aron, 2003).

The researcher chose the method of *convenience* and *quota sampling*, a non-probability approach to sampling, as the workplaces involved in the study had been self-selected to participate in Sea 2 Sea in previous years, and self-report physical activity data had been recorded by participants prior to the study been carried out. The researcher decided beforehand the type and number of workplace coordinators the questionnaire (see Appendix A, p.116) would be administered to from the pool of workplaces that were included in the study. The researcher did not have the opportunity to randomly select a sample of the population in the Christchurch region and break down the target

population into clusters thereby ensuring workplaces were of comparable size. Random sampling, stratified sampling and cluster sampling, therefore, were not valid sampling techniques to use.

4.5 PARTICIPANTS

There were two groups of participants involved in this study: individual participants and workplace coordinators.

Individual participants

Each individual participant had to be associated with a workplace and register for the Sea 2 Sea Challenge through their workplace, and to be working part-time, full-time or casual hours. Participants were encouraged to complete the physical activity with a "buddy" from their workplace. The total number of individuals sampled was 3,757.

Workplace coordinators

Workplace coordinators were associated with a workplace that had registered for the 2007 Sea 2 Sea Challenge. Any person within the workplace was able to work in the workplace coordinator role, whether they work part-time, full-time or on a casual basis; there was no limit regarding the size of the workplace. Also, the workplace coordinators could hold any occupation within the workplace. Workplace coordinators had the responsibility of registering individuals from their workplace who chose to participate in the Sea 2 Sea Challenge. The total number of workplace coordinators sampled was 75.

4.6 RECRUITMENT AND DATA COLLECTION

The study participants were selected from a list of Sea 2 Sea registrations for 2007 on the Sport Canterbury database. Permission was granted by Sport Canterbury to access the Sea 2 Sea database and recruit subjects from the list of workplaces registered for the challenge. Recruitment for the Sea 2 Sea Challenge was undertaken through the use of email, the Sea 2 Sea and Sport Canterbury website and formal letters of invitation to workplaces. Participants registered with their workplace through the workplace coordinator. Workplace coordinators had contacted Sport Canterbury about registering their workplace and being part of the Sea 2 Sea Challenge in previous years. All returned physical activity charts were used to identify workplaces that completed the challenge.

Data for the self-report physical activity charts was initially collected by the Sea 2 Sea Coordinator following the end of the Sea 2 Sea Challenge. In July 2008, the questionnaires were mailed and emailed to each workplace coordinator whose workplace was eligible to participate in the study. The majority of electronic questionnaires were returned immediately, with some workplace coordinators choosing instead to complete the paper questionnaire. The researcher followed up workplace coordinators who had not returned the questionnaire with emails and a phone call to the workplace, which proved to be valuable in receiving a few more questionnaires. Some workplace coordinators were on leave and responded upon return.

Each individual and workplace was coded, subsequently receiving a number to identify the participant and a number to identify the workplace they belonged to. Individual and workplace identities were kept anonymous throughout the research. Data collected from the physical activity charts for each participant and paper questionnaires for workplace coordinators, were kept in a locked cabinet; data for both physical activity charts and electronic questionnaires were coded and entered into a password protected computer. Only the researcher and project supervisors had access to the data during and after the study. After completion of the study, data will be kept securely for 7 years by the University of Canterbury.

4.7 INCLUSION AND EXCLUSION CRITERIA

All workplaces in the greater Christchurch area which were listed on the Sea 2 Sea database were invited to participate in the study. The inclusion criteria consisted of workplaces being: 1) within the greater Christchurch area; 2) registered under a workplace name; 3) prepared to receive weekly encouragement emails. Those registered included large corporate workplaces, and middle and small-sized workplaces, medical surgeries, and schools. Participants not connected with a workplace were not included in this study, as this study looked at participation in a workplace environment, assessing individual physical activity levels on a workplace basis.

4.8 SELF-REPORT PHYSICAL ACTIVITY CHARTS

All Sea 2 Sea participants registered through their workplace were asked to fill out a daily self-report physical activity chart (Appendix A, p. 116) for the 6-week duration of the challenge, and return this to Sport Canterbury. Physical activity charts were either delivered by the Sea 2 Sea Coordinator and staff from Sport Canterbury or mailed to workplaces registered in the Sea 2 Sea Challenge.

The physical activity chart included the participants name, workplace name and present level of physical activity of the individual. Using this chart, all participants were asked to record daily the time (in minutes) they spend on physical activity. Further data, such as the age and ethnicity of participants were not included, as the physical activity chart was designed prior to the study without the researchers input.

4.9 DESIGN OF QUESTIONNAIRE FOR WORKPLACE COORDINATORS

Workplace coordinators of all workplaces participating in the Sea 2 Sea Challenge were asked to complete a questionnaire providing information on their workplace and their experience of the Sea 2 Sea Challenge. The questionnaire was comprised of two sections: Section A: participant characteristics of workplace coordinators; and Section B: characteristics and profile of the workplace and logistics of the Sea 2 Sea Challenge for workplaces. Number 21 in the workplace coordinator questionnaire provided workplace coordinators with the opportunity to comment on the Sea 2 Sea Challenge; their comments were recorded verbatim (Table 13, p. 127).

The researcher developed the questionnaire according to the aims of the study. The questionnaire was designed to avoid questions that could be ambiguous, resulting in different respondents interpreting questions differently, or too confusing, adding to non-response. The questionnaire was tested on family, friends and work colleagues to ensure understanding and ease of completion of the questionnaire. Statistics New Zealand (1995) considers it necessary to establish whether a questionnaire will work, since the designer can never see the questions through the eyes of respondents. The following areas were also taken into consideration when designing the questionnaire (see Figure 2, p. 53):

Figure 2 Impact of other aspects of a survey on a questionnaire design

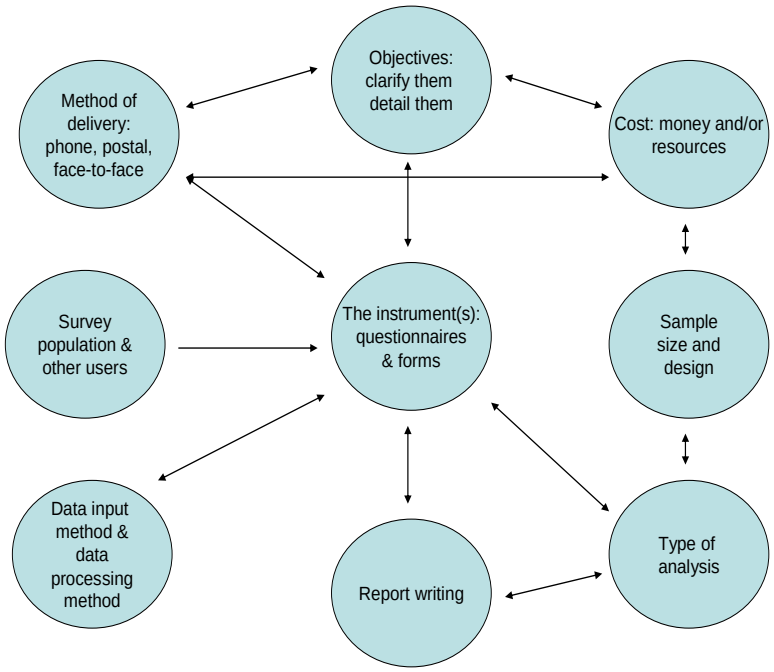


Figure X. All aspects involved in designing a questionnaire. Adapted from "A Guide to Good Survey Design," by Statistics New Zealand, 1995, p. 42.

In the development of the questionnaire, the researcher also considered possible uses of the survey data beyond this current study, in particular to:

- Improve future health promotion initiatives (Sea 2 Sea Challenge).
- Improve the general knowledge of the level of support by workplaces for physical activity.

Workplace coordinators had the option of completing a Sea 2 Sea Challenge questionnaire online through the University of Canterbury Information Technology Department. The survey was accessible under: http://surveyserver.canterbury.ac.nz/limesurvey/index.php?sid=39321&lang=en. A paper option was also mailed to each workplace coordinator along with a self-addressed envelope. The survey was estimated to take 10-15 minutes to complete.

4.10 DATA ANALYSIS

Data from the self-report physical activity cards and workplace coordinator questionnaires were entered into Microsoft Excel and then imported into a statistical package (SPSS Version 18) for statistical analysis. A correlation test served as the primary statistical procedure to measure any association between workplace participation rate and amount of physical activity and workplace coordinator support, percentage participation and level of physical activity.

One-way repeated measures analysis of variance (ANOVA) was used to ascertain whether mean participation levels varied with workplace size. An Independent Sample t-Test was used to establish whether there was any association between type of workplace and amount of physical activity, on the assumption that the variance is approximately the same and follows a normal distribution. An Exploratory Factor Analysis was performed to identify any common themes for workplace support. For Spearman's Rank Correlation Coefficient the test statistic is rho, One-Way ANOVA the test statistic is F and for the Independent Samples t-Test.

5 RESULTS

The following chapter provides both the descriptive analysis and further statistical analysis where necessary, from the study.

5.1 INTRODUCTION

Chapter 2 (4, p. 7) gave an outline of the study design, data collection methods, participants, statistical analysis and inclusion and exclusion criteria. The Results Chapter encompasses five sections as outlined below. The first section describes the level of self-reported physical activity of all individuals for whom physical activity charts are available, the amount of time each participant reports dedicating to physical activity, this time being equated to distance at a rate of ten minutes per one kilometre and the level of individual participation for each workplace (5.2.2, p. 57).

The second section presents the descriptive results from the workplace coordinator questionnaire, including participant characteristics of workplace coordinators (5.3.1, p. 64), characteristics and profile of the workplace and logistics of the Sea 2 Sea Challenge for workplaces (5.3.2, p. 67).

The third section presents the descriptive results to establish the level of workplace involvement and support by workplace co-ordinators to encourage participation from employees in their workplace. In addition, further analysis examines a possible association between workplace participation rate and the amount of physical activity, and type of workplace and amount of physical activity (5.4, p. 74).

The fourth section reports the descriptive results for the characteristics and profile of the workplace coordinator including the level of their involvement and association between workplace coordinator support, percentage participation and level of physical activity (5.5, p. 78). The final section reports the profile of workplace themes towards the Sea 2 Sea Challenge (5.6, p. 83).

5.2 PHYSICAL ACTIVITY LEVELS FOR ALL PARTICIPANTS

The following section provides a break down of the profile of the participants and their levels of physical activity across the six weeks during the Sea 2 Sea Challenge.

5.2.1 Profile of participants

A record of physical activity over the Sea 2 Sea Challenge was available for a total of 688 participants, associated with 54 workplaces, these responses recording minutes of physical activity on the self-report physical activity chart. There were 540 females (78.5%) and 145 males (21.1%) and 3 people (0.4%) did not specify their gender. As mentioned in (4.6, p. 50), ethnicity and age are not known as they were not included on the self-report physical activity chart when data had already been collected prior to the researcher beginning this study.

5.2.2 Level of physical activity: weekly basis

Level of physical activity was measured by the number of minutes recorded by participants on the self-report physical activity chart. A large number of participants (> 70%) reported doing ≥ 30 minutes of physical activity for at least five days or more a week (≥ 150 minutes in total), across weeks 1-5. Table 1 (p. 58) provides a more detailed breakdown of the amount of self-reported physical activity over seven days, for five weeks. Approximately three-quarters of participants reported doing more than the minimum 30 minutes of physical activity over five days and possibly over the typical working week (Monday-Friday). It was not recorded if the buddy challenge was taken up or who their buddy might be.

Table 1 Weekly distribution of physical activity for weeks 1-5 for all participants

Amount of physical activity (minutes)	Week 1		Week 2		Week 3		Week 4		Week 5	
	n	%	n	%	n	%	n	%	n	%
Zero	2	(0.3)	3	(0.4)	6	(0.9)	1	(0.1)	9	(1.3)
1-49	3	(0.4)	3	(0.4)	4	(0.6)	6	(0.9)	6	(0.9)
50-99	20	(2.9)	22	(3.2)	28	(4.1)	22	(3.2)	37	(5.4)
100-149	42	(6.1)	42	(6.1)	63	(9.2)	40	(5.8)	30	(4.4)
150[a]	65	(9.4)	91	(13.2)	80	(11.6)	83	(12.1)	93	(13.5)
151-180	139	(20.2)	146	(21.2)	130	(18.9)	142	(20.6)	120	(17.4)
181-210[b]	417	(60.6)	381	(55.4)	377	(54.8)	394	(57.3)	393	(57.1)

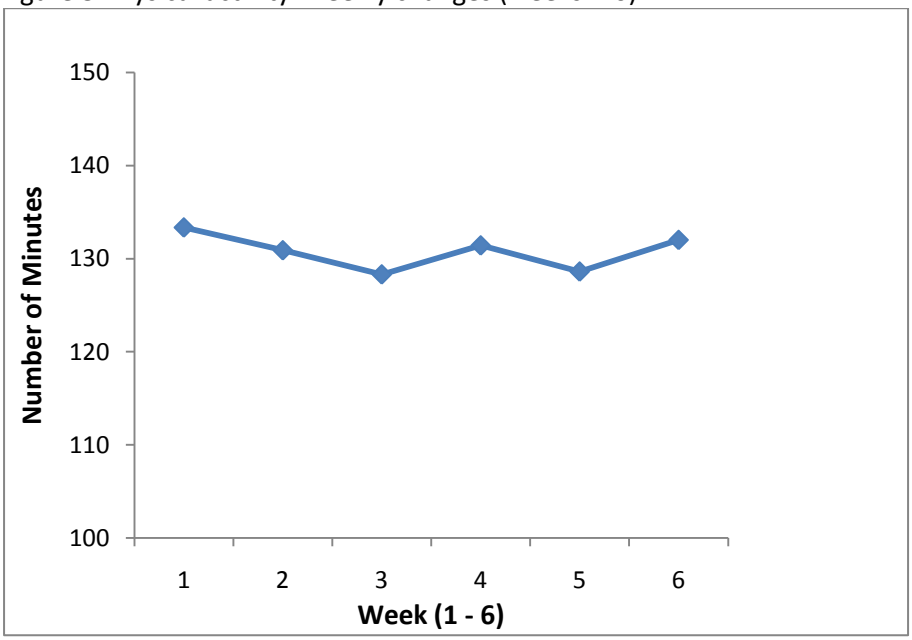
Note. The total number of participants in the study was 688. The figure in each cell represents the proportion of all participants for that week. Physical activity data for week 6 is eliminated from the results due to the Sea 2 Sea Challenge finishing on a Friday (5 days) in week 6.

[a] Undertaking 30 minutes of physical activity each day over five days is equivalent to 150 minutes. This category is on its own due to most workplaces operating Monday-Friday, with the possibility of employees buddying up with someone from within their workplace.

[b] Thirty minutes over seven days equals a total of 210 minutes

Little variation could be observed in physical activity levels over the six weeks in the Sea 2 Sea Challenge (see Figure 3, p. 58).

Figure 3 Physical activity: weekly changes (weeks 1-6)



Participants were grouped into four categories: enthusiasts, weekenders, non-enthusiasts and regulars according to different levels of physical activity. No variation occurred within the groups over time, however, a large number met criteria for the enthusiasts group (mean group membership = 54.8%). See (Table 2, p. 59) for a breakdown and description of the four groups.

Over half (54.8%) of the participants in the Sea 2 Sea Challenge completed ≥ 150 minutes per week and ≥ 60 minutes per weekend whereas 13.2% completed < 150 minutes per week and < 60 minutes per weekend. The non-enthusiasts group (13.2%) were classified as not meeting the physical activity requirements of 30 minutes or more of physical activity on five or more days per week, set by the Ministry of Health (2006). Participants did not stay in the same group throughout the challenge, some perhaps moving from the enthusiasts group into the weekenders group. Figure 4 (p. 60) shows the distribution of physical activity across the four groups over time.

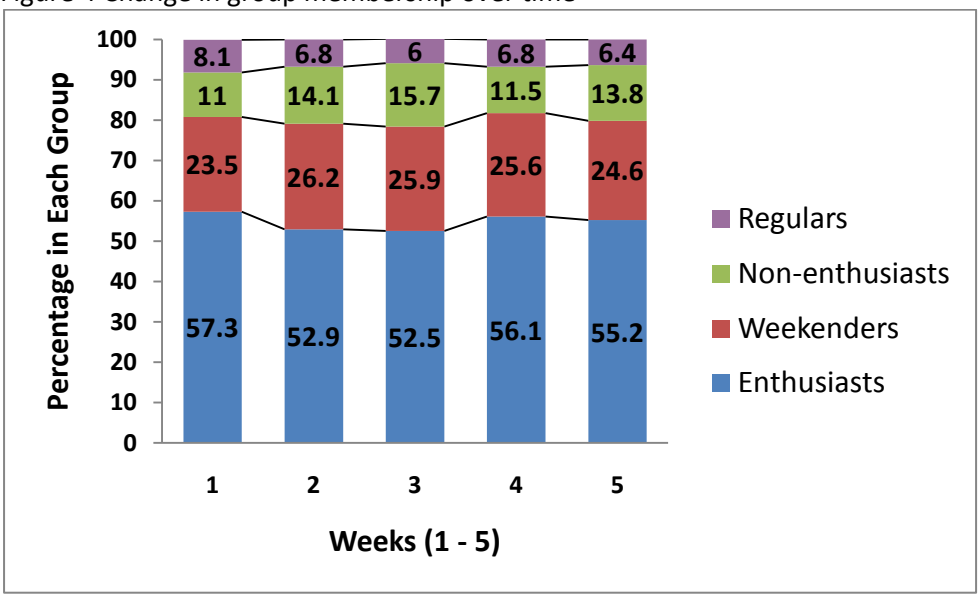
An enthusiast is a person who undertakes: ≥ 150 minutes per week and ≥ 60 minutes per weekend of physical activity. **A weekender is a person who undertakes:** < 150 minutes per week and ≥ 60 minutes per weekend of physical activity. **Non-enthusiasts are people who undertake:** < 150 minutes per week and < 60 minutes per weekend of physical activity. **Regulars are people who undertake:** ≥ 150 minutes per week and < 60 minutes per weekend of physical activity.

Table 2 Distribution in group membership for week 1-5

Week	Enthusiasts		Weekenders		Non-enthusiasts		Regulars	
	n	%	n	%	n	%	n	%
1	394	(57.3)	162	(23.5)	76	(11.0)	56	(8.1)
2	364	(52.9)	180	(26.2)	97	(14.1)	47	(6.8)
3	361	(52.5)	178	(25.9)	108	(15.7)	41	(6.0)
4	386	(56.1)	176	(25.6)	79	(11.5)	47	(6.8)
5	380	(55.2)	169	(24.6)	95	(13.8)	44	(6.4)

Note. The total number of participants in the study was 688. The figure in each cell represents the proportion of all participants for that week.
n= Number of participants, %= Percentage of participants.

Figure 4 Change in group membership over time



5.2.3 Level of physical activity: weekly extra, weekend and weekend extra

The number of mean minutes across the categories; *weekly extra, weekend and weekend extra*, recorded by participants in the six-week challenge showed small variability over time (weeks 1-5) (see Table 3, p. 60). Weekly, weekend and weekend extra physical activity: weeks 1-5

Table 3 Level of physical activity: weekly extra, weekend and weekend extra

When the physical activity was undertaken	**Mean number of minutes (weeks 1-5)**				
	Week 1	**Week 2**	**Week 3**	**Week 4**	**Week 5**
Weekly extra (minutes)	62.8	61.9	54.8	62.9	66.0
Weekend (minutes)	53.4	52.7	52.4	53.9	52.5
Weekend extra (minutes)	50.7	47.4	48.9	51.8	51.0

Note. The total number of participants in the study was 688.

For the *weekly extra results,* approximately 26 % of participants did not complete extra minutes of physical activity, choosing to complete the minimum of 30 minutes per day. However, Approximately 25% of participants did an extra 30 minutes of physical activity each day, undertaking at least 60 minutes of total physical activity each day, double the recommended requirements set by

the Ministry of Health. Table 4 (p. 62) demonstrates the distribution of percentage of people undertaking *extra* minutes of physical activity over seven days, for five weeks.

Table 4 Distribution of weekly extra physical activity: weeks 1-5

Amount of physical activity (minutes)	Week 1		Week 2		Week 3		Week 4		Week 5	
	n	%	n	%	n	%	n	%	n	%
Zero	176	(24.9)	182	(26.5)	179	(26.0)	185	(26.9)	187	(27.2)
1-50	102	(14.8)	107	(15.6)	109	(15.8)	96	(14.0)	83	(12.1)
51-100	137	(19.9)	140	(20.3)	139	(20.2)	141	(20.5)	145	(21.1)
101-150	96	(14.0)	82	(11.9)	104	(15.1)	76	(11.0)	90	(13.1)
151-200	50	(7.3)	53	(7.7)	38	(5.5)	44	(6.4)	45	(6.5)
201-250	49	(7.1)	33	(4.8)	42	(6.1)	55	(8.0)	42	(6.1)
≥ 251	78	(11.3)	86	(12.5)	72	(10.5)	84	(12.2)	90	(13.1)

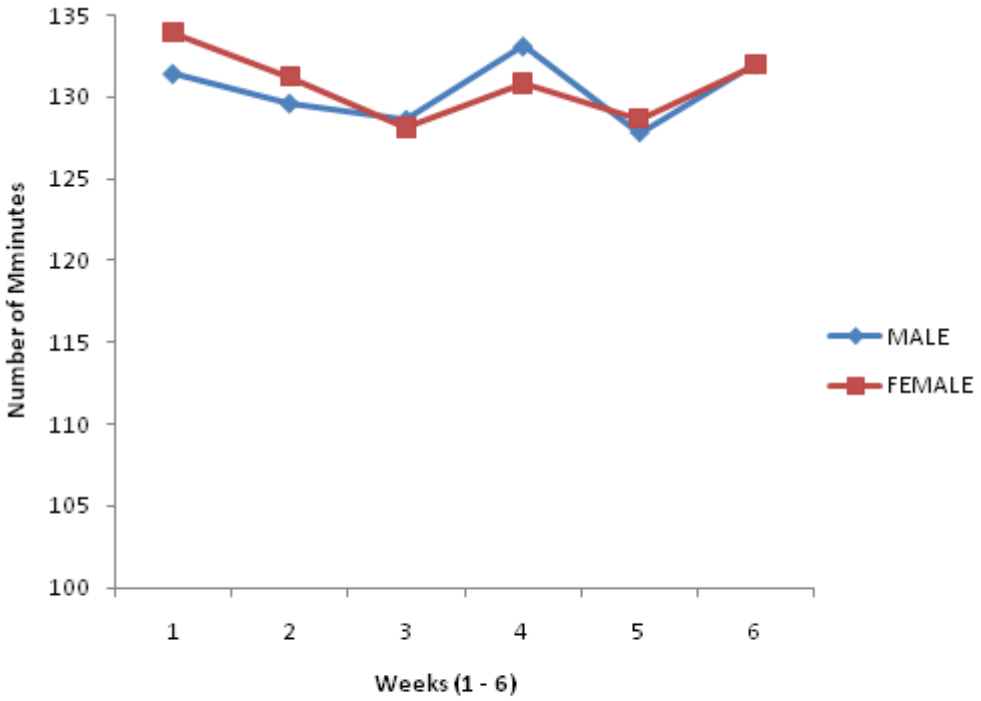
Note. The total number of participants in the study was 688. The figure in each cell represents the proportion of all participants for that week.
n= Number of participants, %= Percentage of participants.

5.2.4 Physical activity by gender

As mentioned earlier, in (5.2.1, p.57), of the 688 participants, 540 were female (78.5%), 145 male (21.1%) and 3 did not specify gender (0.4%). There are many reasons which could explain the differences in gender representation (6.4.4, p. 93).

Although females had a slightly higher number of minutes of physical activity recorded at the start of the challenge (weeks 1-2), males recording more minutes later (week 3-4), there was no significant variability in the result (mean minutes =130.4 for males, SD =2.08, and mean minutes =130.8 for females, SD = 2.14) (see Figure 5, p. 63). No differences were observed in the *weekly extra, weekend* and *weekend extra* minutes for gender. Participants not specifying gender were not included in the results. A Repeated Measures ANOVA on the number of minutes per *week* of physical activity, over a six-week period showed no statistically significant differences between males and females (F = 0.01; df = 1, 683; p = 0.94). In the Repeated Measures ANOVA for *weekly extra minutes*, there was no statistically significant difference between males and females (F = 0.02; df = 1,683; p = 0.88).

Figure 5 Physical activity by gender by all participants



5.3 WORKPLACE COORDINATOR QUESTIONNAIRE

The questionnaire for workplace coordinators of the Sea 2 Sea Challenge was completed by 54 of a possible 72 coordinators. The questionnaire had two sections, headed “About Yourself” and “About Your Workplace” and was used for establishing the level of workplace involvement and support by workplace coordinators to encourage participation from employees in the workplace.

5.3.1 Section A – “About Yourself”

Personal characteristics including the age, gender, occupation and level of activity of the workplace coordinators who responded to the Sea 2 Sea Questionnaire and participated in the Sea 2 Sea Challenge are summarised in Table 6. Age and occupation is not known for all participants completing the self-report physical activity card. Fifty four workplace coordinators responded to the question on gender in the workplace coordinator questionnaire, a substantial majority being females (n=45) with 8 males and 1 not specified. A higher percentage of females (83%) represented their workplace as a workplace coordinator compared to males (14.8%), workplace coordinators choosing to not specify (1.9%) (see “gender” section in Table 6, p. 66).

Workplace coordinators were asked to indicate their age within the following five groups; less than 25 years, 25-39 years, 40-54 years, 55-69 years, 70 years or more. Workplace coordinators in the 40-54 group had the highest representation (38.9%), the 25-39 group closely behind (33.3%). A lower proportion were in the 55 – 69 group (18.5%) and very few in the less than 25 years (5.6%). The 70 years or more group was not represented (see “age” section in Table 6, p. 66).

Workplace coordinators were asked in the questionnaire for the title of their position in the workplace. The occupation of the workplace coordinator is classified into six groups under the headings: Manager, Teacher, Nurse, Receptionist, Health Professional and Other. One in three (33.3%) of workplace coordinators were placed in the group named ‘Other’, reflecting the wide range of workplaces in the Sea 2 Sea Challenge, followed by Teacher (14.8%), Nurse (13.0%) and Manager (14.8%). Those in the Health Professional group had the lowest representation (9.3%); 3.7% of workplace coordinators chose to not specify their workplace occupation. Refer to the “occupation” section in (Table 6, p. 66) for the break-down of occupation groups.

Workplace coordinators were asked in the questionnaire: When you are at work, which one of the following best describes what you do? The main occupation of the Workplace coordinator involved sedentary behaviour, for example, sitting (74.1%), whereas approximately one in six (16.8%) occupations involved mostly walking or performing light labour (see "level of activity" section in Table 6, p. 66).

A Cross-tabulation was performed to investigate which level of work activity corresponded to the occupation of the Workplace coordinator. Sixteen (29.6%) workplace coordinators who chose occupation group 'Other' and eight (14.8%) who chose 'Manager' consist of mostly sitting. For further information on the results for this question (see Table 5, p. 65).

Table 5 Cross tabulation: physical demand of workplace coordinators role

Occupation	Mostly sit		Mostly stand		Mostly walk or perform light labour		Don't know/not applicable	
	n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Manager	8	(14.8)	0		0		0	
Receptionist	6	(11.1)	0		0		0	
Health Professional	3	(5.6)	0		1	(1.9)	1	(1.9)
Teacher	3	(5.6)	2	(3.7)	3	(5.6)	0	
Nurse	4	(7.4)	0		2	(3.7)	2	(3.7)
Other	16	(29.6)	0		3	(5.6)	0	
Total	**40**	**(74.1)**	**2**	**(3.7)**	**9**	**(16.8)**	**3**	**(5.6)**

Note. The total number of workplace coordinators in the study was 54.
n= Number of workplace coordinators, %= Percentage of workplace coordinators.

Table 6 Participant characteristics of workplace coordinators

Characteristics	***Workplace coordinator (n = 54))***	
	n	%
Administration		
Workplace coordinator questionnaire	54	__
Gender		
Male	8	14.8
Female	45	83.3
Not Specified	1	1.9
Age (years)		
Less than 25 years	3	5.6
25-39 years	18	33.3
40-54 years	21	38.9
55-69 years	10	18.5
Not Specified	2	3.7
Occupation		
Other	18	33.3
Manager	8	14.8
Teacher	8	14.8
Nurse	7	13.0
Receptionist	6	11.1
Health Professional	5	9.3
Not Specified	2	3.7
Level of activity		
Mostly Sit	40	74.1
Mostly Walk/Perform Light Labour	9	16.7
Mostly Stand	2	3.7
Not applicable	2	3.7
Don’t Know	1	1.9

Note. The total number of workplace coordinators in the study was 54.

5.3.2 Section B – "about your workplace"

The following descriptive results refer to the characteristics and profile of the workplace, taken from the workplace coordinator questionnaire. (see Table 8). Workplace coordinators were asked in the questionnaire: "Sea 2 Sea has been running since 2004, which year(s) has your workplace participated in the Sea 2 Sea Challenge?" 2007 attracted the highest number of workplaces (87%) compared to 2006 (55.6%), 2005 (27.8%) and 2004 (24.1%). Note that there should have been 100% participation in 2007 due to workplaces having returned completed physical activity cards and responded to the workplace coordinator questionnaire for 2007. From 2005 to 2007, there was approximately a 30% increase in number of workplaces participating each year. See (Table 7, p. 67) for frequency table outlining year of workplace participation.

Table 7 Year of workplace participation

Year of participation	Number of workplaces per year	Percent of workplaces per year
2004	13	(24.1)
2005	15	(27.8)
2006	30	(55.6)
2007	47	(87.0)

Note. Total number of workplace coordinators in the study was 54.

Approximately one in three (35.2%) workplaces participating in the Sea 2 Sea Challenge are in "Health care", one in four identify themselves in the "Education" sector and one in five (20.4%) identify themselves in the "Other" category. (see "category/sector" section in Table 8, p. 70).

Of the 54 workplaces studied in the Sea 2 Sea Challenge, approximately one in three (31.7%) workplaces are located near a park, one in three (30.5%) workplaces located in the city, whereas one in five (18.3%) workplaces are situated near a shopping mall, and one in ten (9.8%) workplaces near a sporting complex and in an industrial area. (see "location of workplace" section in Table 8, p. 70).

Three out of four (75%) workplace coordinators stated that there were new participants in the Sea to Sea challenge in 2007. Nearly half (48.1%) of workplace coordinators stated that some non-physically active participants were recruited compared to one in five (18.5%) who stated that only

those currently physically active were recruited. (see “recruitment of participants” section in Table 8, p. 70).

Workplace coordinators were asked the type of support their workplace provided for employees participating in Sea 2 Sea. Over half (55%) of workplace coordinators stated the workplace encouraged employees to do at least some physical activity, 50% stating their workplace promoted a team spirit to encourage employees throughout the challenge and approximately one in three (31.5%) stated the workplace encouraged employees to do 30 minutes of physical activity on five days or more each week (see “workplace support towards employees” section in Table 8, p. 70).

Approximately three out of four (77.8%) workplaces registered for the Sea 2 Sea Challenge both to encourage employees to be physically active and boost physical activity levels. Over half (53.7%) of workplaces reported they value team spirit between employees. Participation in the Sea 2 Sea Challenge was supported by workplaces due to nearly half (48.1%) of workplace coordinators stating the physical activity challenge was worthwhile, and achievable/attainable (46.3%). Two out of five (42.6%) workplaces were attracted to the challenge aspect of completing 30 minutes of physical activity each day, an equivalent of a total distance of 240kms. (see “reasons why workplace signed up” section in Table 8, p. 70).

Workplace Coordinators were asked what impact/outcome Sea 2 Sea had on their workplace. Approximately half (53.7%) reported small differences, two out of five (40.7%) reported more staff participating in physical activity, one in four (25.9%) reported an increase in energy levels and productivity. One in four (24.1%) stated a higher team spirit than at baseline, one in five (22.2%) stated increased self-esteem amongst employees, one in five (20.4%) reported more support and encouragement towards physical activity and one in ten (9.3%) reported high staff morale in the workplace. (see “impact/outcome on workplace” section in Table 8, p. 70).

Workplace coordinators were asked if their workplace did a number of specified health promotion tasks. Approximately three out of four (72.2%) reported that they promote health and well-being and two out of three (66.7%) reported that they promote physical activity. One in three (33.3%) workplaces organise sports teams and physical activities (27.8%) (see “workplace organise/promote” section in Table 8, p. 70).

Approximately three out of five (63.0%) workplaces provide encouragement to do physical activity and live a healthy life, half (48.1%) of workplaces provide flexible working hours to juggle family commitments/important events, while for one in three (35.2%) workplaces senior management and/or Human Resource showed support for Sea 2 Sea. Approximately one in three (29.6%) workplaces provided employees leave to attend sporting events, while one in six (16.7%) provided financial support and encouragement for workplace physical activity initiatives. (see “workplace provide” section in Table 8, p. 70).

Approximately three out of four (72.2%) workplace coordinators indicated they would continue to participate in future Sea 2 Sea programmes and one in five (18.5%) workplace coordinators were unsure if they will continue to participate. (see “workplace continue in future Sea 2 Sea Challenges” section in Table 8, p. 70).

Table 8 Characteristics and profile of workplace

Selected options by workplace coordinator	***n***	***%***
Category/sector of workplace		
Health Care	19	35.2
Education	13	24.1
Other	11	20.4
Government Department	4	7.4
Finance	3	5.6
Manufacturing	2	3.7
Don't know	2	3.7
Location of workplace		
Near a park	26	31.7
In the city	25	30.5
Near a shopping mall	15	18.3
Near a sporting complex	8	9.8
In an industrial area	8	9.8
Recruitment of participants [a]		
New participants	40	74.1
Same participants	29	53.7
Non physically active	26	48.1
Easier to recruit	12	22.2
Currently active	10	18.5
Harder to recruit	9	16.7
Don't know	3	5.6
Workplace support towards employees [a]		
Encouragement to undertake at least some physical activity	30	55.6
Promote team spirit throughout the challenge	27	50.0
Encouragement: 30 minutes/per day/5 or more days each week	17	31.5
Other	4	7.4
Don't know	4	7.4
Reasons why workplace signed up [a]		
Encourage employees to be physically active	42	77.8
Boost physical activity levels	42	77.8
Increase team spirit between employees	29	53.7
Worthwhile	26	48.1
Achievable/Attainable	25	46.3
Complete a challenge	23	42.6

Chance at winning a spot prize	19	35.2
Other	4	7.4
Don't know	1	1.9
Impact/outcome on workplace [a]		
Small differences	29	53.7
More staff participating in physical activity	22	40.7
Increase in energy levels and productivity	14	25.9
Higher team spirit than before (at baseline)	13	24.1
Increased self esteem amongst employees	12	22.2
More support and encouragement towards physical activity	11	20.4
High staff morale	5	9.3
None at all	4	7.4
Other	3	
Workplace organise/promote [a]		
Promote health and well being	39	72.2
Promote physical activity	36	66.7
Organise sports teams	18	33.3
Organise physical activities	15	27.8
Don't know	2	
Workplace provide [a]		
Encouragement to do physical activity and live a healthy life	34	63.0
Flexible working hours to juggle family commitments/important events	26	48.1
Senior management and/or Human Resource support for Sea 2 Sea	19	35.2
Magazines/articles relating to physical activity/well-being	16	29.6
Leave to attend sporting events	16	29.6
Discounted gym membership at a gym/health club	11	20.4
Financial support and encouragement for workplace physical activity initiatives	9	16.7
Other	3	5.6
Don't know	1	1.9
Workplace continue in future sea 2 sea challenges		
Yes	39	72.2
No	2	3.7
Don't know	10	18.5
Missing	3	5.6

Note. The total number of workplace coordinators in the study was 54.
[a] More than one option could be selected by workplace coordinators (hence % is not out of 100%).

5.3.3 Logistics of the sea 2 sea challenge for workplaces

Workplace coordinators were asked questions regarding logistics of the Sea 2 Sea Challenge to assist Sport Canterbury in making improvements to future physical activity initiatives. Approximately one in four (24.1%) of workplace coordinators reported physical activities within the workplace continued on from the Sea 2 Sea Challenge, whereas three out of four (75.9%) said "no" (see "physical activities continuing on from Sea 2 Sea Challenge" section in Table 9). Approximately three out of five (61.1%) stated the weekly Sea 2 Sea motivational email was helpful and three out of four (77.8%) found the Sea 2 Sea posters and wall chart motivating (see "was the weekly Sea 2 Sea motivational email helpful?" and "were the Sea 2 Sea posters and wall chart motivating?" section in Table 9). Approximately one in five (22.2%) stated the stair prompts encouraged employees to take the stairs instead of the lift, whereas one in four (25.9%) said "no" and one in five (18.5%) said "don't know" (see "did the stair prompts encourage employees: stairs instead of lift?" section in Table 9, p. 73). One third of workplaces did not respond to this question, possibly because it was not applicable, for example, if there were no stairs in the workplace.

Workplace Coordinators were asked how Sea 2 Sea could be better tailored to the needs of their workplace. Approximately half (51.9%) of workplace coordinators stated sufficient information was given to meet the needs of the workplace, one in three (31.5%) workplaces showed an interest in workplace presentations by Sport Canterbury, and one in three (27.8%) of workplace coordinators would like more advertisements/posters for the workplace (see "how could Sea 2 Sea be better tailored to the needs of your workplace" section in Table 9, p. 73).

Table 9 Logistics of the sea 2 sea challenge for workplaces

Selected options by workplace coordinator	***n***	***%***
Physical activities organised by the workplace continuing		
Yes	13	24.1
No	41	75.9
Was the weekly sea 2 sea motivational email helpful?		
Yes	33	61.1
No	9	16.7
Don't Know	6	11.1
Missing	6	11.1
****Were the sea 2 sea posters and wall chart motivating?***		
Yes	42	77.8
No	5	9.3
Don't Know	3	5.6
Missing	4	7.4
Did the stair prompts encourage employees: stairs instead of lift?		
Yes	12	22.2
No	14	25.9
Don't Know	10	18.5
Missing	18	33.3
How could sea 2 sea be better tailored to the needs of your workplace? [a]		
Sufficient information was given to meet the needs of our workplace	28	51.9
Workplace presentations by Sport Canterbury	17	31.5
More advertisements/posters to workplace	15	27.8
Receiving the weekly Sea 2 Sea motivational email was enough	11	20.4
More communication besides the weekly motivational emails	6	11.1
Don't know	2	3.7

Note. The total number of workplace coordinators in the study was 54.
[a] More than one option could be selected by workplace coordinators (hence % is not out of 100%).

5.4 THE LEVEL OF WORKPLACE INVOLVMENT

The following section outlines the characteristics, profile and level of workplace involvement. A comparison between health and non-health workplaces is also outlined.

5.4.1 Level of self-reported physical activity

This section examines the level of self-reported physical activity summarised across *workplaces* and the *level of workplace involvement.* Individuals in workplaces completed approximately 41 minutes of physical activity per day (SD = 10.1 minutes). The mean minutes of physical activity per day for each participant was calculated. The mean over all participants was then calculated within each individual workplace and then averaged over all workplaces. Approximately 1 in 3 (31.4%) employees across all workplaces participated (SD = 28.5%) in the Sea 2 Sea Challenge. The proportion of employees that participated was taken from the total of employees within the workplace.

Further analysis was carried out to investigate any association between levels of workplace participation and individual physical activity. The Spearman's Rank Correlation Coefficient showed no significant relationship between workplace participation rate and physical activity, averaged over all individuals (rho = -.23, p = 0.095). The hypothesis of no association between workplace participation and the amount of physical activity is not rejected.

5.4.2 Participation rate by workplace size

The Sea 2 Sea Challenge incorporates workplaces of all sizes; prior to this study, participation rates based on size of the workplace were unknown. Participation rate was compared with the number of employees within the workplace. Workplace size was defined as the number of employees within the workplace. The self-report physical activity chart provided the workplace name to assess the level of percent of workplace participation, enabling the participant to be matched with the appropriate workplace.

The variable "workplace size" was divided into four categories: small, medium, large and very large workplace in the study. The workplace size was determined by the researcher contacting each

workplace. The Statistics New Zealand website classifies small workplaces as consisting of (n = < 20) employees. This information formed the basis of the following groupings: small = < 20 employees; medium = 20-50 employees; large = 51-100 employees; and very large = > 100 employees. The small workplace group had the highest mean participation rate 51% (SD = 33.8), obtained by averaging the 6 participation rates over the 6 workplaces in that group. The lowest mean participation rate by employees was found in the very large workplaces 15% (SD = 9.4) (see Table 10, p. 75).

Those from small workplaces (< 20 employees) were more likely to participate in the Sea 2 Sea Challenge compared to those from large workplaces (> 100 employees). Possible explanations for smaller workplaces having higher participation rates in the Sea 2 Sea Challenge than larger workplaces can be found in (6.3.2, p. 89).

Table 10 Participation rate by workplace size

Workplace group (as defined by number of employees)	Number of workplaces participated [a]	Number of employees participated [b]	Total number of employees in workplace [c]	Mean participation rate % [d]	SD Participation rate %	Ratio of employees participated
< 20	18	77	173	51	33.8	(1 in 2)
20-50	15	141	564	29	23.9	(1 in 4)
51-100	9	172	786	22	17.8	(1 in 5)
>100	7	298	2234	15	9.4	(1 in 7)

Note. The total number of individuals in the workplaces studied was 688.
[a] Number of all workplaces associated with each workplace group that participated.
[b] Number of all employees associated with each workplace group that participated.
[c] Total number of employees in the workplace, including those that did and did not participate.
[d] The mean participation rate over all workplaces in each workplace group.

Initially participation rate by workplace size was analysed; however, due to the variability in the results, especially between small (mean = 51%, SD = 33.8%) and large workplaces (mean = 15%, SD = 9.4%), further analysis was conducted. A One-way ANOVA was used to analyse if mean participation levels varied with workplace size. A statistically significant difference in percentage of participation was found ($F = 4.113$; $df = 3, 50$; $p = 0.011$). A Post hoc test (Bonferroni) was used to ascertain which groups had significantly different participation rates. Table 15 in (Appendix C, p. 128) contains the Bonferroni result comparing participation rates by workplace size. Workplaces with < 20 employees had significantly higher ($p = 0.038$) participation rates compared to workplaces with more than 100

employees. A downward trend occurs in participation rates as workplace size increases (see Table 10, p. 75).

5.4.3 Number of workplaces and participation levels

An investigation on the proportion of employees participating within each workplace was undertaken. It is difficult to know the exact number of employees in the workplace because the workplace coordinators indicated some uncertainty in their responses to the question. The researcher followed up some queries by phone but could not always get reliable information. Some participants may also not have returned the self-report physical activity chart.

Workplaces were placed into five groups according to level of participation: less than 10% participation, 10-24%, 25-50%, 51-75% and more than 75% participation. Forty-three workplaces, consisting of 3,576 total employees across the workplaces, had 50 % or lower level of participation by employees compared with 11 workplaces, totalling 254 employees, which had participation rates of more than 50% in the Sea 2 Sea Challenge. Ten workplaces had < 10 % of participation with a mean of 5%, obtained by averaging the 10 participation rates over the 10 workplaces in that group. Six workplaces had > 75 % of participation and a (mean = 88%). The largest group (n = 24) had between 10-24 percent participation from the workplace. See (Table 11, p. 76) showing descriptive results for number of workplaces and percent of participation levels.

Table 11 Group membership and workplace participation

Workplace group (as defined by % of participation)	Number of workplaces participated [a]	Number of employees participated [b]	Total number of employees in workplace [c]	Mean participation rate % (workplace group) [d]	SD Participation rate % (workplace group)	Ratio of workplaces participated
< 10	10	55	3779	5	2.6	(1 in 5)
10-24	24	279	1983	17	5.1	(2 in 5)
25-50	9	173	574	36	7.5	(1 in 6)
51-75	5	131	199	67	5.1	(1 in 10)
>75	6	50	55	88	10.8	(1 in 10)

Note. The total number of workplaces in the study was 54.
[a] Number of all workplaces associated with each workplace group that participated.
[b] Number of all employees associated with each workplace group that participated.
[c] Total number of employees in the workplace, including those that did and did not participate.
[d] The mean participation rate over all workplaces in each workplace group.

Workplace group and amount of physical activity

A comparison was carried out between 54 workplaces within the health industry and workplaces not in the health industry (health and non health workplaces), to determine whether the number of minutes of physical activity for those working in health was higher than for those working in other fields. Health industry workplaces were identified by workplace coordinators' responses in the questionnaire regarding which category their workplace belonged to: health care, education; government department; finance; manufacturing; and other.

The type of workplace group (health and non-health workplaces) was not found to have any significant association with physical activity levels. Approximately twenty participants across all health workplaces completed approximately 40 minutes (mean = 40.15) of physical activity per day (SD = 7.31). Participants from non-health workplaces (n= 34) completed an average of 41 minutes (mean = 41.17) of physical activity per day (SD = 11.58). The mean minutes of physical activity per day for each participant was calculated. The mean over all participants was then calculated within each individual workplace and finally these means were averaged over all health and all non-health workplaces.

To support the descriptive analysis a formal statistical test was conducted. The mean number of minutes per day in each workplace followed an approximate normal distribution and therefore an Independent Samples t-Test was used to compare health workplaces and non-health workplaces. There was no significant relationship between level of self-reported physical activity and workplace group. The distribution of mean number of minutes per week is the same across both groups; ($t = .356$, $df = 52$, $p = .724$). The hypothesis of no difference in activity level between health and non-health workplaces is not rejected. The Independent Sample t-Test was used as it is a more powerful test due to the assumptions the variance is approximately the same and follows a normal distribution between the groups.

5.5 THE LEVEL OF WORKPLACE COORDINATOR INVOLVEMENT

The following section outlines the characteristics, profile and supporting role of the Workplace coordinator.

5.5.1 Characteristics and profile of workplace coordinator

Word of mouth was the main method of recruitment by workplace coordinators, approximately three out of four (74.1%) reported using this method. Nearly half (48.1%) of workplace coordinators reported using the sign-up-sheet in the staffroom, and nearly half (46.3%) reported using email as a form of recruitment (see "method of recruitment by workplace coordinator" in Table 12, p. 126). Approximately four out of five (80%) of workplace coordinators reported spending less than ten minutes per day as workplace coordinator (see "duration of time as workplace coordinator" section in Table 12, p. 79).

Workplace coordinators were asked why they became the workplace coordinator. Approximately three out of five (59.3%) chose to be the workplace coordinator because they enjoy motivating people to do physical activity, two out of five (40.7%) acted by default as they were the workplace coordinator the previous year. Approximately two out of five (38.9%) reported they like to increase staff morale in the workplace whereas one in three (35.2%) received the letter to be the workplace coordinator by Sport Canterbury, therefore, choosing by default. Approximately one in twelve (7.4%) said their supervisor/manager asked them to and (7.4%) said don't know (see "reasons for becoming workplace coordinator" section in Table 12, p. 79).

Support by the workplace coordinator varied with 90.7% of workplace coordinators putting the Seas 2 Sea wall chart in a visible place, two out of five (83.3%) recruiting participants to take up the challenge, and three out of five (61.1%) forwarding the weekly Sea 2 Sea motivational email. Half of workplace coordinators encouraged employees to arrange regular physical activities, approximately two out of five (44.4%) looked at the Sea 2 Sea website for physical activity ideas and one in three (33.3%) placed Sea 2 Sea stair prompts in or near any lifts (see "support by workplace coordinator to participants" section in Table 12, p 79). Note that, earlier in Table 9, p. 73, approximately one third of workplaces did not respond to the question "did the stair prompts encourage employees: stairs

instead of lift" section, possibly because it was not applicable, for example, if there were no stairs in the workplace.

Table 12 Characteristics and profile of workplace coordinator

Selected options by workplace coordinator	***n***	***%***
Method of recruitment by workplace coordinator [a]		
Word of mouth	40	74.1
Sign up sheet (staffroom)	26	48.1
Email	25	46.3
Other	5	9.3
Duration of time as workplace coordinator		
Less than 5 minutes a day	20	37.0
5-10 minutes a day	21	38.9
More than 10 minutes a day	8	14.8
None at all	1	1.9
Don't know	2	3.7
Missing	2	3.7
Reasons for becoming workplace coordinator [a]		
Like motivating people to do physical activity	32	59.3
The Workplace Coordinator for Sea 2 Sea the previous year	22	40.7
Increase staff morale in the workplace	21	38.9
Received the letter to be the Workplace coordinator from Sport Canterbury	19	35.2
Supervisor/Manager asked me to	4	7.4
Don't know	4	7.4
Support by workplace coordinator to participants [a]		
Sea 2 Sea wall chart in a visible place	49	90.7
Recruit participants to take up the challenge	45	83.3
Forward the weekly Sea 2 Sea motivational email	33	61.1
Encourage employees to arrange regular physical activities	27	50.0
Look at the Sea 2 Sea website for physical activity ideas	24	44.4
Sea 2 Sea stair prompts in or near any lifts	18	33.3
Other	5	9.3
Scale 0-10: level of difficulty for recruiting participants by workplace coordinator [a,b]		

Note. The total number of workplace coordinators in the study was 54.
[*] More than one option selected by workplace coordinators (% is not out of 100%).
[a,b] Refer to Table 2 in (Appendix C, p. 126).

5.5.2 Comments recorded by workplace coordinator about the sea 2 sea challenge

Workplace coordinators were given the opportunity to write comments at the end of the questionnaire, either about the Sea 2 Sea Challenge or what is happening in their workplace in regards to physical activity. Overall, the majority of workplace coordinators were enthusiastic towards the Sea 2 Sea Challenge, many stating their work colleagues were finding ways to be physically active during lunch time. The comments made by the workplace coordinators reflect three main themes: (1) Staff currently undertake and continue to do physical activity in the workplace, (2) work/time pressure/barriers affecting physical activity participation, and (3) reflections on the Sea 2 Sea Challenge by workplace coordinators (see Table 13, p. 80).

Table 13 Comments recorded by workplace coordinators

Theme 1. Staff currently undertake and continue to do physical activity in the workplace
• "Staff generally walk up to 9,000 paces in 8 hours and are doing partial lifts of people into wheelchairs after using hydraulics and slings. Very physical most of the day, getting enough exercise in 8 hour shift. Core strength competent."
• "Staff are pretty active anyway."
• "During the summer we continue to do our daily lunchtime walks when weather and time permits!"
• "Regular physical activity taken at lunchtimes."
• "Many do regular walking anyway. Staff organise tramping trips and day trips."
• "Friendly Friday afternoon football games for staff (usually male) and occasionally against another school staff."
• "Most have joined a gym which opened in our building – attendance is high."
• "More staff are included in some form of sports/activity."
• "Some staff members still go for 20-30 min walks at lunchtime."
• "We still work the clients when weather is fine. When warm weather comes it will be easier to get them out. We did the Sea to Sea because of the clients to get them more active – which also help staff get a bit more active too."
• "Every morning @ 9:30am a group of us walked two laps of Porritt Park."
• "I'm always active but I know it has encouraged others to move!"
Theme 2. Work/time pressures/barriers affecting physical activity participation
• "I found it very hard to fit in the physical exercise last year and had to do it in short bursts. (I think others found it as busy). We're all busy people, some staff have dogs, they take them for walks which helps them also."
• "Work shift work 24/7 so different staff each day. Most of us do 12 hr shifts with 30 min meal breaks if lucky but not all together so difficult to get together."

- "Most of us work shift work – so difficulty maintaining any momentum ie physical activity on a regular basis. That limits participation."
- "I think that the challenge is good, unfortunately no support from the company and some workers not participating well didn't help my efforts last year."

Theme 3. Reflections on the sea 2 sea challenge by workplace coordinators

- "A good idea."
- "Fun activity to do."
- "It's easy and achievable. Has got people started to think about their life styles."
- "It is very important for the workplace to be actively involved in promoting physical activity/well-being. More incentives may be necessary to help find participants."
- "Was good to have awareness of need for physical activity highlighted – organisers provided lots of encouragement."
- "Really enjoy doing the Sea 2 Sea Challenge. I believe its important to get today's teenagers "doing" physical activity."
- "I had participated when working in general practice and thought it would be a good challenge for my hospital work mates. At the hospital it seems to be each individual area that organises events. Management do send email but not everyone takes notice of these."
- "Fun activity. At the hospital it seems to be each individual area that organises events. Management do send email but not everyone takes notice of these."
- "I felt my workplace was really crap supporting me in this. I was only able to attract one other person to do this. I'm not sure why because we all sit around most of the day and complain about getting fat.
- I felt the Sea to Sea Challenge people needed to push the management and editor of (workplace name censored) and try and do the hard sell themselves with staff. There was very little encouragement or support from bosses or colleagues."
- "I suspect the chance to win a spot prize was a major motivation. So more prizes would be good (even if small)."
- "The initial instructions need to be more precise."
- "Would be great if staff could enter individual results on line and these could be viewed."
- "Sea 2 Sea getting stale needs a lift. Not sure what but as the challenge arrives it is harder to get people back on board. Just wee bit boring, needs face lift."
- "Enjoyed being co-ordinator."
- "Good at the time, will do again."
- "Great event, really motivated staff."
- "Am looking forward to sea 2 Sea 2008!"

5.5.3 Extent of workplace coordinator support

Each workplace in the Sea 2 Sea Challenge had an assigned workplace coordinator (4.5, p. 50). The workplace coordinator's role included providing data about the workplace: for example, the number of employees within the workplace, and the number of employees registering for the Sea 2 Sea. The workplace coordinator was in the key position for encouraging employees to join in the challenge by placing sign-up sheets in the staffroom, and posters and stair-prompts (if the workplace had stairs) throughout the workplace, and by reading the Sea 2 Sea website for physical activity ideas for the workplace. It was essential that workplace coordinators passed on the Sea 2 Sea Challenge packs containing the participant's self-report physical activity charts, and the encouragement emails from the Sea 2 Sea Coordinator containing ideas for being physically active throughout the challenge.

Initially 54 workplaces were included in the results for workplace coordinator support, however, thirteen workplaces were omitted from the final results due to very low numbers of employees in the workplace (n = <10 employees) and the consequent lack of robustness in percentages calculated with small denominators. Forty-one workplace coordinators were studied to determine the extent of support by workplace coordinators. Workplace coordinators completed questions 3, 5 and 8 in the workplace coordinator questionnaire relating to support for the physical activity initiative. Thirteen optional support activities in questions 3, 5 and 8 reflected support by the workplace coordinator. Table 15 in (Appendix C, p. 126) outlines the thirteen optional support activities and the frequency table outlines the workplace coordinator support (see Table 16 in Appendix C, p. 126). Selecting all thirteen options represented the highest level of support by the workplace coordinator for the Sea 2 Sea Challenge. The options available for the workplace coordinator to select ranged from 0 to 13 responses.

The number of optional support activities used by the workplace coordinator varied between the minimum = 2 and the maximum = 13 (mean = 7, SD = 2.7). Three groups were arbitrarily classified for summary purposes as low-support, moderate-support and high-support to reflect the extent of support by workplace coordinators. A large proportion (n = 16; 39.0%) of workplace coordinators selected between 1-6 options (defined as low-support) for the Sea 2 Sea Challenge. A higher percentage (n = 18; 43.9%) of workplace coordinators selected between 7-9 options (moderate-support) and a small proportion of the workplace coordinators (n = 7; 17.1%) selected between 10-13 options (highly-supportive).

An investigation was carried out to determine if the level of support by the workplace coordinator was correlated with the level of (%) participation and/or level of physical activity in the Sea 2 Sea Challenge. The Spearman's Rank Correlation Coefficient showed no significant relationship between workplace coordinator support and participation rate, averaged over all individuals (rho = -.11, p = 0.50). Note that a rank correlation coefficient of 1 indicates that the lowest level of support corresponds to the lowest participation rate, the second lowest values correspond to the second lowest participation rate and the highest level of support corresponds to the highest participation rate.

A Spearman's Rank Correlation Coefficient was used to analyse workplace coordinator support and level of physical activity. No statistically significant relationship was found (rho = 0.09, p = 0.52). The hypothesis of no association between workplace coordinator support, percentage participation and level of physical activity is not rejected.

5.6 EMERGING WORKPLACE THEMES

The Sea 2 Sea Challenge is a unique workplace challenge over a six week period, involving workplaces of different sizes and in various sectors, for example, health, education, and manufacturing. Workplaces participated in the Sea 2 Sea Challenge for different reasons, ranging from the challenge/winning aspect to the encouragement to do physical activity for its personal or workplace benefits. Designing a physical activity challenge to attract workplaces from various sectors can be a challenge in itself. Reasons why workplaces signed up to the Sea 2 Sea Challenge were investigated.

An Exploratory Factor Analysis was conducted on 54 workplaces to identify any common themes for workplace support on questions 7, 8, 19 and 20 in the workplace coordinator questionnaire. The scree plot indicated between 6 and 8 themes. The factor loadings enabled an interpretation of the first six factors to be; 1 challenge/winning, 2 team-spirit, 3 organise physical activities, 4 physical activity/well-being, 5 flexibility/support and 6 encourage physical activity. Table 14 (p. 84) depicts the six themes accompanied by the factor loading scores. The six factor solution would explain 63.0% of the variance in data (see Table 19 in Appendix C, p. 129) for Total Variance Explained. See also Figure 6 in (Appendix C, p. 130) showing scree plot identifying common themes in workplace support.

Table 14 Workplace themes interpreted from factor loadings

Questions Used [a]	Challenge/ winning	Team spirit	Organise physical activity	Physical activity/ well-being	Flexibility / support	Encourage: physical activity
Q7a encouragement: physical activity	-.147	.333	.156	.189	.022	.507
Q7b 30 minutes physical activity 5days	-.012	.221	.176	.124	.241	.742
Q7c promote team spirit	-.037	.794	.019	.054	.269	.112
Q8a employees physically active	.054	.528	-.114	.101	-.378	.126
Q8b increase team spirit: employees	.184	.827	.208	-.024	-.015	.051
Q8c complete a challenge	.494	.325	.407	-.345	-.114	-.058
Q8d chance at winning a spot prize	.597	.431	-.268	-.106	.032	.004
Q8e it seemed worthwhile	.724	.051	-.188	.027	.000	-.080
Q8f it seemed achievable/attainable	.841	.030	.166	-.126	.078	.073
Q8g to boost physical activity levels	.540	-.219	-.212	.322	-.015	.197
Q19a organise sports teams	-.015	.023	.873	-.025	.150	.060
Q19b organise physical activities	-.263	.036	.822	.280	-.129	.046
Q19c promote physical activity	.160	.095	.337	.760	-.094	.022
Q19d promote health and well-being	-.211	.408	-.165	.649	.038	-.255
Q20a discounted gym membership	-.080	.021	.090	.136	.334	-.730
Q20b magazines: physical	.028	.151	-.147	.264	.061	.083

activity						
Q20c encouragement do physical activity	-.094	-.107	.037	.815	.085	.089
Q20d flexible working hours	.003	-.023	-.113	-.091	.684	.020
Q20e leave to attend sporting events	-.059	-.045	.216	.027	.578	-.324
Q20f financial support: physical activity	-.261	.104	.289	.065	.487	-.263
Q20g senior management/HR support	.217	.122	-.037	.148	.687	.136

Note. Table above is a rotated component matrix from a Principal Component Analysis with Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 13 iterations.

[a]These questions related to workplace themes and were taken from workplace coordinator questionnaire

The highest factor loadings were chosen in each column, once chosen, they were not available for selection to describe other themes.

6 DISCUSSION

The following chapter provides a discussion for the key findings reported in the previous chapter (Chapter 5). This is followed by the limitations, strengths, recommendations and questions for further research.

6.1 INTRODUCTION

Fundamental to this study is the importance of individuals being moderately active for 30 minutes every day. A high number (66%) of New Zealanders in the workforce are in sedentary occupations. Consequently, promoting a physical activity programme such as the Sea 2 Sea Challenge within the workplace is an ideal setting. The Sea 2 Sea Challenge was designed to encourage people, specifically employers and employees in workplaces, practitioners and patients in primary care settings, members of community groups, and people from low socio economic populations to be more regularly active. The success of the Sea 2 Sea in encouraging physical activity has been documented in previous reports (Dowman & Hamilton, 2006) and is supported in the current study (Nichol, 2007).

This study addressed the following research question: "What is the relationship between the level of participation of and support from employing organisations involved in the Sea 2 Sea Challenge, and the amount of self-reported physical activity undertaken by participants across these organisations?" In other words did the level of support by the workplace and workplace coordinator influence employees to participate in the Sea 2 Sea Challenge. The study aimed to establish the level of self-reported physical activity of all individuals within the study and the amount of time each participant reported dedicating to physical activity. The study also aimed to establish the level of individual participation from each participating workplace and the level of support by workplace co-ordinators to encourage participation from employees in the workplace.

Results presented in Chapter 5 and discussed in this chapter have the constraints of a low cost and modest evaluation of a large workplace based health promotion programme. The results draw on limited self report data obtained from and returned by participants as part of the Sea 2 Sea Challenge, and further data obtained by the researcher through a questionnaire completed by workplace coordinators. Participants' physical activity levels were reported using the guidelines given by the Ministry of Health, New Zealand and WHO. To meet the requirements of being classified as regularly physically active, participants had to undertake at least 30 minutes or more of moderate physical activity on five or more days per week, for duration of no less than ten minutes in any one session. Participants were able to count three 10 minute bouts of physical activity to meet the 30 minutes duration. All respondents to the programme filled out a daily physical activity chart for the six week duration of the challenge. The physical activity chart included the workplace name and present level of physical activity of the individual. The self-report physical activity chart required participants to shade in boxes to represent the amount of time spent engaging in physical activity

each day. The questionnaire completed by the workplace coordinators described the level and types of support they and their employing organisation offered as part of the Sea 2 Sea Challenge.

6.2 KEY FINDINGS FOR WORKPLACE COORDINATOR INVOLVEMENT

Thirteen optional support activities in questions 3, 5 and 8 reflected support by the workplace coordinator. A large proportion (39.0%) of workplace coordinators selected 1-6 options were (defined as low-support) for the Sea 2 Sea Challenge. An unexpected finding was that the extent of support by workplace coordinators in the Sea 2 Sea Challenge was overall quite low. Various possible reasons for low support from workplace coordinators include a possible lack of time to forward emails on or look up the Sea 2 Sea Challenge website. It seems a large number of workplace coordinators did not freely take up the position as workplace coordinator for the Sea 2 Sea Challenge, two out of five (40.7%) acted by default as they were the workplace coordinator the previous year and (35.2%) received the letter to be the workplace coordinator by Sport Canterbury, therefore, choosing by default. Another possible reason could be that the workplace coordinator was not an *active* health promotion role in the Sea 2 Sea Challenge, merely someone to pass the information on to the rest of the workplace, completing minimal tasks that take a small amount of time. However, the role of the workplace coordinator is very important in communicating information about the Sea 2 Sea Challenge to employees within the workplace. This is particularly important in the beginning stages of the Sea 2 Sea Challenge as a large number (83.3%) of workplace coordinators reported recruiting participants to take up the challenge.

Although it was reported that the majority (80%) of the workplace coordinators spent less than ten minutes per day as workplace coordinator, the tasks involved in those ten minutes were crucial for participants to feel encouraged throughout the Sea 2 Sea Challenge. For example, each week a motivational email was sent through to the workplace coordinator to forward onto all employees that signed up for the Sea 2 Sea Challenge, the email containing many ideas on how to keep active throughout the challenge. Word of mouth being the main form of recruitment, approximately three out of four (74.1%) reported using this method. The workplace coordinator placing the sign-up-sheet in the staffroom and the use of email was also effective, nearly half of workplace coordinators reported using these forms of recruitment for the Sea 2 Sea Challenge.

6.3 KEY FINDINGS FOR WORKPLACE PARTICIPATION

The following section discusses the key findings for workplace participation, including the differences observed in workplaces according to the level of workplace participation and workplace size. The continuation of physical activity within the workplace and for future Sea 2 Sea Challenges is also outlined.

6.3.1 Level of workplace participation

Workplaces were placed into five groups according to level of participation: less than 10% participation, 10-24%, 25-50%, 5-75% and more than 75% participation. A large number of workplaces (n = 24) had between 10-24 percent participation in the Sea 2 Sea Challenge. This result represents quite low participation, with less than a quarter of the employees from within the workplace represented in the challenge. The reasons for low participation include many factors, known and unknown. For example, some workplaces may have groups which were better informed about the challenge than other groups located on a different level within the organisation, for example, medical staff in hospital wards versus administrative staff. Some workplaces may have offices located throughout the Christchurch region, such as government departments, making it hard for one person to coordinate and encourage all of their employees to participate. Another possible explanation is that the overall ratio of workplace coordinators to the number of employees may have contributed to low participation. For example, workplaces that had higher than 24 percent participation were generally from small workplaces which may have had more support from the workplace coordinator. The programme did not have an equal ratio of workplace coordinators to number of employees in the workplace which may have affected these final results.

6.3.2 Workplace size

Workplaces small in size with < 20 employees had significantly higher participation rates compared to large workplaces with more than 100 employees. A downward trend in participation rates was observed as workplace size increased. For large workplaces, the ratio of one workplace coordinator per 100 employees is greater than small workplaces with one workplace coordinator per 20 employees. This may limit the effectiveness of the workplace coordinator by the volume of people the workplace coordinator interacts with. In the Sea 2 Sea Challenge, each workplace had one

workplace coordinator. The Sea 2 Sea Challenge also included key motivators of support and encouragement from within the workplace. Employees were encouraged to 'buddy up' with someone from their workplace/friends or family. Thus, another possible explanation for differences in workplace size and participation rates is that it may be easier for those in smaller workplaces to 'buddy' up with a colleague compared to those in larger workplaces due to the close working relationships that can occur in small workplaces. The literature supports the finding of strong positive associations between physical activity and social support, using cross sectional and prospective study designs (Ståhl et al., 2001). The social environment was strongly associated with being physically active; it is possible that participants from small workplaces compared to large workplaces perceived high levels of social support the workplace coordinator and within the workplace in general. These participants could be more likely to be physically active compared to those from a non-supportive workplace. For instance, a characteristic of a non-supportive workplace is that of which employees' do not perceive as having support from the employer.

6.3.3 Sedentary behaviour

Sedentary behaviour, for example sitting, was prominent in most occupations stated by the workplace coordinator, 74.1% reported sitting as the main activity at work. This result is similar to those reported in the literature as occupations increasingly introduce technology replacing job tasks that traditionally involved active behaviour. Sedentary behaviour among New Zealand women is reported to be on the increase according to the Ministry of Health (2008). This highlights the importance of workplace health promotion programmes to encourage employees to incorporate more incidental leisure-time activity into daily life and break up the time spent sitting.

6.3.4 Continuation of activities organised by the workplace

Few workplace coordinators (24.1%) reported a continuation of physical activities organised by the workplace after the Sea 2 Sea Challenge had finished. Participants' are shown to take part in these activities during the duration of the Sea 2 Sea Challenge, however, workplace coordinators report that participants appear much less likely to carry on in the activities organised by their workplace after the Sea 2 Sea Challenge has finished. However, it cannot be concluded that participants, are or are not, continuing to undertake physical activity in their own time. Suggestions are made by Sport Canterbury on possible activities the workplace can implement on an ongoing basis, however, it is not known if the participants do not enjoy the activities offered by the workplace or why they only appear to want to undertake physical activity during the six week period. Perhaps if the Sea 2 Sea

Challenge was longer in duration employees may have continued to be physically active as interest in the workplace challenge gained momentum and more robust habits around physical activity might be formed.

6.3.5 Personal motivation

This study highlighted issues in workplace based programmes to promote physical activity. A number of key motivational factors or themes were identified in this study as presented in Chapter 5 of the results section. The Sea 2 Sea Challenge was seen to be worthwhile by workplaces and individual participants. The questionnaire showed a high level of support from workplaces towards the health and well-being of their employees. A key motivational factor, challenge/winning, supports the design of the study which challenged participants to walk with their buddies the equivalent of walking from the West Coast to the East Coast (240km) over the six-weeks. Most participants were able to achieve the goals of the programme which may have influenced the challenge/winning factor to be the highest rated motivation. Health promotion interventions, that offer incentives or a challenge are more successful in the number of participants that sign up (Conrad, 1988b).

6.3.6 Work-life balance

An important feature identified in the literature is what constitutes a healthy workplace. Offering employees the flexibility to maintain a balance between work and family is integrated into work life balance. Some examples given include workplaces providing childcare, flexible schedules and job security. Flexibility and support was identified as the fifth factor in the Exploratory Factor Analysis reported in the results (5.6, p. 83). It is important that these factors are integrated in a healthy workplace. As the literature suggests, the higher the support from the workplace towards employee health, decreased risks for behavioural and lifestyle factors that are associated with physical inactivity and disease are observed (Grawitch et al., 2006).

6.3.7 Continuation of future sea 2 sea challenges

Overall, workplaces were enthusiastic about the Sea 2 Sea Challenge as a workplace intervention. A very high number of workplace coordinators (72.2%) indicated that their workplace would continue to participate in future Sea 2 Sea programmes. This is a very encouraging result showing that the continuation of future Sea 2 Sea Challenges by Sport Canterbury is widely accepted as a health promotion programme for people in the Christchurch region.

6.4 KEY FINDINGS FOR SEA 2 SEA PARTICIPANTS

The following section outlines the key findings for the participants in the Sea 2 Sea Challenge. The group of participants that sustained a level of commitment throughout the programme and the increased interest for a workplace based programme is provided. Possible explanations for the differences observed for gender is also discussed.

6.4.1 Activity levels for all participants

A high proportion (> 70%) of respondents were reported as sufficiently active over the period of the Sea 2 Sea Challenge, meeting the physical activity guidelines set by the Ministry of Health, New Zealand and WHO. However, the physical activity status of those who participated but did not complete the self-report physical activity chart and those from workplaces that did not participate in the Sea 2 Sea Challenge are unknown. It is encouraging however, that people participated in a workplace based programme throughout this period despite the possible barriers. For example, the programme ran in the middle of spring which usually comes with very changeable weather in Christchurch including minimum temperatures and rain.

6.4.2 Enthusiasts

A potentially important finding in the study was the sustained commitment of those who reported maintaining their physical activity levels over the six-week period, with relatively minimal input and support from workplace coordinators and employers. This group of enthusiasts will no doubt act as role models for other employees in the workplace to undertake the required levels of physical activity. Although the study was short term, this programme proved to be successful as a workplace intervention in the Canterbury region, at least for this group of people. From the perspective of health promotion targeted to the working population that represents a significant and low cost, if short term, outcome for a substantial group. This raises useful pointers for improvement of Sea 2 Sea in future years, for example, how this group of enthusiasts could be extended and supported to serve as “Healthy Workplace Champions”.

6.4.3 Growth of the sea 2 sea challenge

The Sea 2 Sea Challenge has been running successively since 2004 with an increase in workplaces taking part each year. From 2005 to 2007, there was approximately a 30% increase in workplaces

participating each year. Although the physical activity status of every individual cannot be identified due to baseline data being unavailable, the results from the workplace coordinator questionnaire report that nearly half of those recruited were non-physically active prior to the Sea 2 Sea Challenge. Not having the base-line data to determine activity status of participants' is a limitation to the study, however, the importance of collecting baseline data in future programmes has been made in the recommendations (6.7.1, p. 99).

6.4.4 Gender

A low number of males (n = 145) compared to females (n = 540) were part of the study. This result is consistent with the findings from a previous study, which reported a high percentage of females (82.3%) taking part (Sport Canterbury, 2007). Possible reasons for a disproportionate representation between the genders in the current study include the following;

1. A higher representation of female employees in participating workplaces, particularly those in the health sector (Statistics New Zealand, 2010).

2. the type of design of the health promotion intervention, which may have been more suitable or attractive to women compared to men, for example, through the encouragement for employees to 'buddy up' for social support with someone from their workplace, friends or family, or encouragement to "walk the dog" (Phongsavan et al., 2007; Sallis & Owen, 1999; Stahl et al. 2001).

1. The physical environment and location of some workplaces lacking the space and facilities for participants to undertake physical activity, particularly workplaces in manufacturing which involve mainly men (Giles-Corti & Donovan, 2003; Phongsavan et al., 2007; Statistics New Zealand, 2010).
2. The workplace environment was more encouraging for women to be physically active than men. As shown in the literature, women are more likely to participate in physical activity when there is social support available (Phongsavan et al., 2007; Sallis & Owen, 1999; Stahl, et al., 2001). The Sea 2 Sea Challenge focused on the 'buddy' aspect, encouraging participants to complete the challenge with a work colleague/friend or spouse. This factor may have contributed to the higher number of women participating compared to men. By

employers promoting the Sea 2 Sea Challenge within their workplace, a high level of social support may have been present by physical activity being perceived as “socially acceptable”.

Women and men completed approximately the same amount of physical activity over the six week challenge. This result is contrary to the literature reporting women are less likely than men to meet physical activity recommendations (Wen et al., 2002). As indicated above, possible reasons for this difference include a self-selection bias with more enthusiastic females enrolling in the programme.

6.5 LIMITATIONS

Limitations to the methodology and study design are discussed in this section, followed by limitations of the Sea 2 Sea Challenge. The strengths of this study and the programme are discussed in (6.6.1, p. 97).

6.5.1 Limitations of the study

The results of this study should be interpreted with caution as the study concentrated on workplaces and individuals from those workplaces within the Canterbury region, New Zealand. Also, and importantly, the study consisted of a relatively small, self-selected and probably gender biased sample from the much larger group of those involved in the Sea 2 Sea Challenge. For this reason, participants’ were not representative of all those engaged in the Sea 2 Sea challenge.

Limitations of self-report as a measure of physical activity were inherent in the self-report physical activity chart. A high number of studies in the literature reviewed in Chapter 2 or 3 measured participants’ blood pressure, body mass index (BMI), and oxygen levels (VO2max). The use of self-report may not be as accurate compared to direct methods such as the use of double-laded water or pedometers. The recording of results in the Sea 2 Sea study varied across participants, some reporting minutes of activity while others shading in the box on the self-report chart. The difference in recording the amount of physical activity has meant the calculation of overall effect size and a comparison of results across studies was limited. It is possible participants may have under-reported or over-reported which may be due to participant level of understanding and recall of the amount of physical activity undertaken each day. However, no difference was reported for over-reporting or under-reporting of physical activity between self-report and direct methods in a comprehensive

review across international studies in the literature (Prince et al., 2008). The self-report chart is open to interpretation for entering minutes of self-reported physical activity, exposing it to possible bias in responses given.

The limitations experienced by the researcher in the study include the following;

1. The sample is not necessarily representative of New Zealand workers particularly those in the Canterbury region.

2. Due to limited information on individual participants, for example, reliance on their name and workplace name to be recorded on the physical activity chart, a questionnaire was not able to be given to all participants. The study was limited to self-report physical activity charts that had already been collected by Sport Canterbury prior to the study and a questionnaire to the workplace coordinator.

3. This study involved an observation of participants' in the Sea 2 Sea Challenge over only a six week period. For this reason, limited effects could only be observed in this intervention due to the sample and short time period of the study, limiting the scope of the findings for longer term effects.

4. The current study is different from a longitudinal study which allows for data to be collected more than once on participants throughout and after the intervention. As a result, a change in physical activity levels could not be measured before, during or after the challenge. This creates limitations for identifying whether physical activity levels increased as a result of the Sea 2 Sea Challenge. It is also difficult for the researcher to measure whether participants from workplaces who were previously physically inactive became active due to the intervention and if workplace support increased or stayed the same throughout the challenge.

5. This study could have been further enhanced had information been available to the researcher on the impact physical activity interventions have on energy levels, productivity, morale and self-esteem within the workplace. For example, it is possible that the levels of staff morale, if measured, may have already been low prior to the Sea 2 Sea Challenge. Measuring these levels prior to a health promotion programme, and having a control group, would enhance a comparison of these results.

6. The results on the level of support by workplaces towards the Sea 2 Sea Challenge and support for employee's health and well-being are limited to the responses given by the workplace coordinator. A questionnaire that is sent to every participant enables a more accurate measure of workplace support; however, this option was not available in the study. The interpretation and expectations of what support should be given by workplaces according to the workplace coordinator may be different to the views of the workplace overall.

6.5.2 Limitations of the sea 2 sea challenge

Data available from participants were limited by decisions prior to the present study as to what would be included in the physical activity charts which were intended simply to identify self-report physical activity over the six-week period of the Sea 2 Sea Challenge. Thus data from the participants did not include age, ethnicity or other variables including personal health history which would have been of interest had a more comprehensive evaluation been planned at the outset.

Another limitation is that the intervention may have attracted those already active, therefore replacing the need for a workplace intervention to encourage and motivate them to be active (Conrad, 1988b). Studies in the literature on workplace physical activity programmes report a large number of participants to be physically active prior to the beginning of the intervention. Those physically inactive prior to the programme were considered hard to reach. This provides a gap in the research for investigating the reasons why those physically inactive compared to those already active are not participating in such programmes even when the workplace encourages such participation. To address possible reasons for influencing physical activity levels in individual participants, future research could include a question regarding what motivates them individually to undertake physical activity. Unfortunately the researcher did not have this opportunity due to data from individual participants being limited to the self-report physical activity chart only. These findings and lack of other findings are partial to the limitations and implications of the study. A generalised limitation to the programme is that it does not have a built in feedback evaluation and improvement for each year.

6.6 STRENGTHS

The following section provides a break-down of the strengths of the study and the strengths of the Sea 2 Sea Challenge.

6.6.1 Strengths of the study

Given the limited research in the area of workplace support for a health promotion programme, particularly in New Zealand, the findings of this study, despite its limitations, provide a useful guide from this more in-depth study of how programmes such as the Sea 2 Sea Challenge could be improved, and what is required to be known from future research.

The study has demonstrated the potential to evaluate workplace based programmes promoting physical activity. The current study has relevance to the physical activity strategy outlined in the New Zealand health strategies by the New Zealand Ministry of Health. The study also had representation from both genders which has enabled a comparison between men and women.

6.6.2 Strengths of the sea 2 sea challenge

1. The study involved moderate behaviour such as walking which is the preferred activity among sedentary individuals taking up physical activity. Walking is associated with lower risks of CVD and all-cause mortality in men and women. The study also added knowledge to the literature on aspects of a programme that may enhance support from the workplace and areas that require further improvements in order to produce optimal support by the workplace.

2. Participants prefer workplace programmes to be designed for ‘fitness’ as opposed to ‘health’ (Conrad, 1988b). For example, most studies identified in the literature search measured BMI, blood pressure and cardiovascular risk. Participants prefer programmes that involve fitness such as walking and taking pedometer readings compared to measuring the above. The current study fills a gap in the literature by measuring outcomes related to fitness and workplace support.

3. The study identified a sub-sample of the much larger group, the participants consisting of enthusiasts who reported maintaining their programme of physical activity over the Sea 2 Sea period, with relatively minimal input and support from Sea 2 Sea coordinators and employers. From the perspective of health promotion targeted to the working population that is a significant and low cost short term impact/outcome for a substantial group. This raises useful questions/pointers for improvement of the Sea 2 Sea Challenge in future years, for example, how this group of enthusiasts could be extended and supported to serve as "Healthy Workplace Champions".

4. The study found that the Sea 2 Sea Challenge is a very low cost and feasible form of health promotion. The intervention ran at minimal cost for the workplaces, the only costs being the workplace coordinator taking simple measures to advertise the programme, for example, forwarding on the emails and putting up posters in the workplace advertising the programme. The workplace coordinator also reported these methods to be motivating.

5. For many workplaces, developing, implementing and monitoring a health promotion programme can be time consuming. The Sea 2 Sea Challenge is developed to enable all workplaces, both large and small, to be part of the intervention, thus saving workplaces time for designing their own individual programme. Due to constant changes in different lifestyle factors contributing to disease and the characteristics that make up the general population, it is hoped that improvements in developing, implementing and monitoring the workplace intervention will continue and that the Sea 2 Sea Challenge will be sustained in the Canterbury region.

6. The perception of the Sea 2 Sea Challenge as a health promotion intervention in this study by participants is positive. There is an increase in numbers of employees and workplaces' participating in the challenge each year and positive feedback towards the programme was received from the workplace coordinators in the questionnaire.

6.7 RECOMMENDATIONS

The following section provides recommendations for health promoters and workplaces to consider for designing future programmes. Recommendations for improving future Sea 2 Sea Challenges are also given.

6.7.1 Recommendations for future programmes

Six factors considered to be important for obtaining high levels of participation have been identified in previous research, these factors including: “visible support of management at all levels within the workplace, multiple systematic ways to reach all employees, effective recruitment methods, enthusiastic staff who act as role models, employee trust that confidentiality will be maintained and motivation incentives” (Fielding, 1990, p.??). The following recommendations from the current study and for the Sea 2 Sea Challenge, build upon this previous research to indicate how future studies could further enhance the effect of health promotion within the workplace. Although the Sea 2 Sea Challenge did not need to address the fifth factor (employee trust that confidentiality will be maintained), there may be circumstances where this may be applicable. For example, issues around body image, weight and other medical conditions may need to be kept confidential from other staff and participants and workplaces may need to be sensitive to these issues when designing programmes.

1. Achieving success in health promotion in a workplace requires the collaboration of management in decision making positions to ensure a supportive environment for improving health outcomes. Further research is required into those factors most likely to foster the short-term impact and long-term outcomes of the Sea 2 Sea Challenge and other workplace based initiatives to promote physical activity, health and well being.

2. Maintaining the social environment within the workplace is important to motivate employees to be physically active. The literature shows that employees who perceived low levels of support from the workplace were more likely to be physically inactive compared to workplaces with a supportive environment (Ståhl et al., 2001). Strategies to promote a supportive workplace environment require further study.

3. A workplaces' primary goal to enhance overall productivity should be to increase physical activity in the most sedentary employees, either at the workplace or as after-work activities. It is important that the programmes do not just attract those who are currently physically active or have no barriers to becoming active participating in the programme. It is recommended that programmes be tailored to specific sub-groups of employees and the impact of such targeting be evaluated.

4. Special recognition should be given to the group of enthusiasts who report maintaining physical activity levels throughout the challenge. Perhaps the workplace could support and encourage these employees to become mentors to their colleagues and encourage more participants to become "Healthy Workplace Champions".

5. It is in every employer's best interests to keep health care costs within the workplace down. One way of achieving this is through providing employees the opportunity to have flexible work hours if possible to fit physical activity into the working day. Research into the benefits for employers of such initiatives deserves exploration. Management in workplaces could also provide consideration to fitness facilities if the workplace is located away from an environment that is not physical activity friendly.

6.7.2 Recommendations for future sea 2 sea challenges:

1. It is recommended that the same units of measurements are used when reporting results, for example minutes/day, instead of shading in the boxes to enter the minutes completed. This would allow for the comparison of results across studies and minimise possible variation in the results.

2. A number of workplaces showed an interest in workplace presentations by Sport Canterbury. This is a very effective form of recruitment for workplaces and is considered to be important in continuing the programme as it reaches a large number of employees in one sitting.

3. Half of the participants were satisfied with the information given in the challenge. This could further be improved to increase the number of employees signing up, as the literature suggests that those more likely to be inactive lacked information about the programmes

(Ståhl et al., 2001). However, providing information on the consequences of physical inactivity on health may discourage some workplaces from participating in physical activity. To keep participants interested it is important to give practical and specific knowledge on programmes and actions on physical activity (Ståhl et al., 2001). By making these activities fun and interesting, participants may be more likely to continue to participate rather than lose interest.

4. The design of the Sea 2 Sea Challenge may not be as attractive for males compared to females, suggesting the need for a change in the way it is advertised to the male population. Perhaps in order to attract more male participants in future Sea 2 Sea Challenges, the inclusion of 30 minutes of vigorous activity considered as being sufficient also could be promoted, for example, suggesting a 30 minute run in the Port Hills in Christchurch. Incentives that are gender specific such as spot prizes consisting of electronics or vigorous activity prizes for men and prizes consisting of clothing vouchers for women may be more attractive for recruiting both men and women. Incentives could also be given, to reward the efforts of workplace coordinators who have a large part to play in passing valuable information on to employees with the workplace.

6.8 QUESTIONS FOR FURTHER RESEARCH

This study has raised various questions which could usefully be addressed in future research, including the following:

1. How best could a longitudinal study measure differences in physical activity levels and workplace support at different points over a period of time?

2. What are the factors that are likely to foster the short-term impact and long-term outcomes of the Sea 2 Sea Challenge and future programmes?

3. What are the best strategies to promote a supportive workplace environment? Furthermore, what is the impact that programmes have on morale within the workplace?

4. Who are the people that are considered minimally active employees, and what is the best method of attracting this segment of the population? Also, what are the more appropriate

programmes to tailor for this sub-group of people and what impact will this have for employees and the workplace? For example productivity.

6.9 CONCLUSION

This study examined self-reported physical activity of a sub group of participants in the 2007 Sea 2 Sea Challenge and the extent of support provided by their workplace. The participants who completed the self-report chart maintained their goal of 30 minutes each day over six weeks, despite a low level of support from the workplace and the workplace coordinator. This suggests that some of the elements of the study are effective, however, what the exact elements are and what are more effective elements than others is unknown. The study affirms the potential value of the workplace as a useful setting for health promotion and has also indicated the need for a more extensive evaluation of the effectiveness of a workplace based health promotion programme. Further investigations could focus on identifying what these elements are and how they could be strengthened. The strengths and the limitations of this study have been outlined, and areas for improvement of the programme design and delivery for future research is outlined. Only a small proportion of studies have measured workplace support in the international literature. It is hoped by the researcher that this current study will add to the limited existing research on workplace support for a physical activity initiative, particularly in New Zealand. The conclusions reached by the researcher could be useful as a guideline when adapting the information to the population outside the parameters of this study. Evaluation of the effectiveness of such workplace programmes will assist Sport Canterbury and various health promoters to better develop future programmes for encouraging physical activity among the working population. Tailoring the Sea 2 Sea Challenge to meet the current needs of workplaces in the Canterbury region will further enhance the relationship between Sport Canterbury, the workplace and key stakeholders. It is hoped the Sea 2 Sea Challenge continues to be current and relevant to workplaces, for example, by matching their goals to encourage health and well-being to their employees. It is also hoped that workplaces continue in the Sea 2 Sea Challenge.

7 REFERENCES

Ainsworth, B. E., Bassett, D. R., Strath, S. J., Swartz, A. M., O'Brien, W. L., Thompson, R. W. (2000). Comparison of three methods for measuring the time spent in physical activity. *Med Sci Sports Exer, 32*, S457 - S464.

Aldana, S. G., & Pronk, N. P. (2001). Health promotion programs, modifiable health risks, and employee absenteeism. *Journal of Occupational and Environmental Medicine, 43*(1), 36.

Allender, S., Hutchinson, L., & Foster, C. (2008). Life-change events and participation in physical activity: a systematic review. *Health Promotion International, 23*(2), 160-171.

Anderson, P. (2008). Reducing overweight and obesity: closing the gap between primary care and public health. *Family Practice, 25*, 10-16.

Armstrong, T., Bauman, A., & Johnson, D. (2000). Physical activity patterns of Australian adults: Results of the 1999 National Physical Activity Survey. Canberra: Australian Institute of Health and Welfare.

Aron, A & Aron, E.N. (2003). *Statistics for Psychology* (3rd ed.). Upper Saddle River, New Jersey: Pearson Prentice Hall.

Auweele, Y., Boen, F., Schapendonk, W., & Dornez, K. (2005). Promoting Stair Use Among Female Employees: The Effects of a Health Sign Followed by an E-mail. *Journal of Sport & Exercise Psychology, 27*(2), 188.

Badland, H., & Schofield, G. (2005). Transport, urban design, and physical activity: an evidence-based update. *Transportation Research Part D, 10*, 177-196.

Badland, H. M., & Schofield, G. M. (2004). Physical activity interventions in the workplace: a review and future for New Zealand research. *New Zealand Journal of Sports Medicine, 32*(1), 14-19.

Ball, K., Bauman, A., Leslie, E., & Owen, N. (2001). Perceived Environmental Aesthetics and Convenience and Company Are Associated with Walking for Exercise among Australian Adults. *Preventive Medicine, 33*, 434-440.

Barnes, M., Maclean, J., & Cousens, L. (2010). Understanding the structure of community collaboration: the case on one Canadian health promotion network. *Health Promotion International, 25*(2), 238-247.

Bassey, E., Patrick, J., Irving, J., Blecher, A., & Fentem, P. (1983). An unsupervised "Aerobics" physical training programme in middle-aged factory workers: Feasibility, validation and response. *European Journal of Applied Physiology and Occupational Physiology, 52*(1), 120-125. doi: 10.1007/bf00429038.

Batty, D., & Lee, I. (2004). Physical activity and coronary heart disease. *British Medical Journal, 328*, 1089-1090.

Bauman, A., Armstrong, T., Davies, J., Owen, N., Brown, W., Bellew, B. (2003). Trends in physical activity participation and the impact of integrated campaigns among Australian adults, 1997–99. *Australian and New Zealand journal of public health, 27*(1), 76-79.

Bauman, A., McLean, G., Hurdle, D., Walker, S., Boyd, J., van Aalst, I. (2003). Evaluation of the national 'Push Play' campaign in New Zealand–creating population awareness of physical activity. *Journal of the New Zealand Medical Association, 116*(1179), 1–11.

Bell, A. C., Swinburn, B. A., Amosa, H., & Scragg, R. K. (2001). A nutrition and exercise intervention program for controlling weight in Samoan communities in New Zealand. *International journal of obesity and related metabolic disorders: journal of the International Association for the Study of Obesity, 25*(6), 920.

Biggam, J. (2008). *Succeeding with Your Master's Dissertation*: Open University Press

Blair, S. N., Piserchia, P. V., Wilbur, C. S., & Crowder, J. H. (1986). A public health intervention model for work-site health promotion: impact on exercise and physical fitness in a health promotion plan after 24 months. *JAMA, 255*(7), 921.

Blamey, A., Mutrie, N., & Tom, A. (1995). Health promotion by encouraged use of stairs. *British Medical Journal, 311*(289).

Boreham, C. A. G., Wallace, W. F. M., & Nevill, A. (2000). Training Effects of Accumulated Daily Stair-Climbing Exercise in Previously Sedentary Young Women. *Preventive Medicine, 30*(4), 277-281.

Brown, W., Mishra, G., Lee, C., & Bauman, A. (2000). Leisure Time Physical Activity in Australian Women: Relationship With Well Being and Symptoms. *Research Quarterly for Exercise and Sport, 71*(3), 206-216.

Brownell, K., Stunkard, A., & Albaum, J. (1980). Evaluation and modification of exercise patterns in the natural environment. *American Journal Psychiatry, 137*, 1540-1545.

Canterbury District Health Board. (2004). Canterbury Health Needs Assessment Summary 2004. Christchurch.

Chan, C. B., Spangler, E., Valcour, J., & Tudor-Locke, C. (2003). Cross-sectional Relationship of Pedometer-Determined Ambulatory Activity to Indicators of Health. *Obesity, 11*(12), 1563-1570.

Conn, V. S., Hafdahl, A. R., Cooper, P. S., Brown, L. M., & Lusk, S. L. (2009). Meta-Analysis of Workplace Physical Activity Interventions. *American Journal of Preventive Medicine, 37*(4), 330-339.

Conrad, P. (1987). Wellness in the Work Place: Potentials and Pitfalls of Work-Site Health Promotion. *The Milbank Quarterly, 65*(2), 255-275.

Conrad, P. (1988a). Health and fitness at work: A participants' perspective. *Social Science & Medicine, 26*(5), 545-550.

Conrad, P. (1988b). Worksite health promotion: The social context. *Social Science & Medicine, 26*(5), 485-489.

Craig, C. L., Brownson, R. C., Cragg, S. E., & Dunn, A. L. (2002). Exploring the Effect of the Environment on Physical Activity: A Study Examining Walking to Work. *American Journal of Preventive Medicine, 23*, 36-43.

Daley, A., & Parfitt, G. (1996). Physical self-perceptions, aerobic capacity and physical activity in male and female members of a corporate health and fitness club. *Perceptual and motor skills 83*(3), 1075-1082.

Danna, K., & Griffin, R. W. (1999). Health and Well-Being in the Workplace: A Review and Synthesis of the Literature. *Journal of Management, 25*(3), 357-384.

De Bourdeaudhuij, I., & Sallis, J. (2002). Relative Contribution of Psychosocial Variables to the Explanation of Physical Activity in Three Population-Based Adult Samples. *Preventive Medicine, 34*(2), 279-288.

Department of Health. (2004). At least five a week: evidence on the impact of physical activity and its relationship to health. A report from the Chief Medical Officer. London: Department of Health.

Department of Labour. (2010), from www.dol.govt.nz

Dowman, M., & Hamilton, G. (2006). Sea 2 Sea - A Workplace Physical Activity Intervention - South Canterbury An Evaluation 2006. Christchurch.

Egger, G., Donovan, R. J., Corti, B., Bull, F. C., & Swinburn, B. S. (2001). Developing national physical actiivty guidelines for Australians. *Australian N Z J Public Health 25*, 561-563.

Fielding, J. E. (1990). Worksite health promotion programs in the United States: progress, lessons and challenges. *Health Promotion International, 5*(1), 75-84.

Freedman, B., Hsu, F., Langefeld, C., Rich, S., Herrington, D., Carr, J. (2005). The impact of ethnicity and sex on subclinical cardiovascular disease: the Diabetes Heart Study. *Diabetologia, 48*(12), 2511-2518. doi: 10.1007/s00125-005-0017-2.

Giles-Corti, B., & Donovan, R. (2003). Relative Influences of Individual, Social Environmental and Physical Environmental Correlates of Walking. *American Journal of Public Health, 93*, 1583-1589.

Gilson, N., McKenna, J., Cooke, C., & Brown, W. (2007). Walking towards health in a university community: A feasibility study. *Preventive Medicine, 44*(2), 167-169.

Grawitch, M. J., Gottschalk, M., & Munz, D. C. (2006). The path to a healthy workplace: A critical review linking healthy workplace practices, employee well-being, and organizational improvements. *Consulting Psychology Journal: Practice and Research, 58*(3), 129-147.

Gutiérrez-Fisac, J., Guallar-Castillón, P., Díez-Gañán, L., García, E., Banegas, J., & Artalejo, F. (2002). Work-related physical activity is not associated with body mass index and obesity. *Obesity, 10*(4), 270-276.

Guyton, A., & Hall, J. (1946). *Human Physiology*: Philadelphia: Saunders.c2000.

Hamer, M., & Chida, Y. (2007). Walking and primary prevention: a meta-analysis of prospective cohort studies. *British Journal of Sports Medicine, 42*, 238-243.

Hardman, A. E. (2001). Issues of fractionisation of exercise (short vs long bouts). *Medicine & Science in Sports & Exercise, 33*(6), S421-S427.

Haskell, W. L., Lee, I. M., Pate, R. R., Powell, K. E., Blair, S. N., Franklin, B. A. (2007). Physical activity and public health: updated recommendation for adults from the American College of Sports Medicine and the American Heart Association. *Circulation, 116*(9), 1081.

Hohepa, M., Schofield, G., & Kolt, G. (2004). Adolescent obesity and physical inactivity. *Journal of the New Zealand Medical Association, 117*(1207), 117-1207.

Jacobson, B. H., & Aldana, S. G. (2001). Relationship between frequency of aerobic activity and illness-related absenteeism in a large employee sample. *Journal of Occupational and Environmental Medicine, 43*(12), 1019.

Judge, T. A., & Bono, J. E. (2001). Relationship of core self-evaluations traits self-esteem, generalized self-efficacy, locus of control, and emotional stability with job satisfaction and job performance: A meta-analysis. *Journal of Applied Psychology, 86*(1), 80-92.

King, G. A., Fitzhugh, E. C., Bassett, D. R., Jr., McLaughlin, J. E., Strath, S. J., Swartz, A. M. (2001). Relationship of leisure-time physical activity and occupational activity to the prevalence of obesity. *International journal of obesity and related metabolic disorders: journal of the International Association for the Study of Obesity, 25*(5), 606-612.

Le Masurier, G., Sidman, C., & Corbin, C. (2003). Accumulating 10,000 steps: does this meet current physical activity guidelines? *Research Quarterly for Exercise and Sport*, 389-394.

Marshall, A. (2004). Challenges and opportunities for promoting physical activity in the workplace. *Journal of Science and Medicine in Sport 7*(1), 60-66.

Matthews, C. E., Chen, K. Y., Freedson, P. S., Buchowski, M. S., Beech, B. M., Pate, R. R. (2008). Amount of Time Spent in Sedentary Behaviours in the United States, 2003–2004. *American Journal of Epidemiology, 167*(7), 875-881. doi: 10.1093/aje/kwm390.

Miller, R., & Brown, W. (2004). Steps and sitting in a working population. *International Journal of Behavioural Medicine, 11*(4), 219-224.

Ministry of Health. (2006). Implementing the New Zealand Health Strategy 2006: The Minister of Health's sixth report on progress on the New Zealand Health Strategy (pp. 153). Wellington.

Ministry of Health. (2008). A Portrait of Health - Key results of the 2006/07 New Zealand Health Survey. Wellington: Ministry of Health.

Murphy, M. H., & Hardman, A. E. (1998). Training effects of short and long bouts of brisk walking in sedentary women. *Medicine & Science in Sports & Exercise, 30*(1), 152-157.

Murphy, M. H., Nevill, A. M., Murtagh, E. M., & Holder, R. L. (2007). The effect of walking on fitness, fatness and resting blood pressure: A meta-analysis of randomised, controlled trials. *Preventive Medicine, 44*(5), 377-385.

Nichol, E. (2007). 2007 Sea 2 Sea Evaluation Report Christchurch: Sport Canterbury. Nutbeam, D. (1998). Health Promotion Glossary, from http://www.who.int/hpr/NPH/docs/hp_glossary_en.pdf

Pate, E. (1995). Physical activity and public health. A recommendation from the Centres for Disease Control and Prevention and the American College of Sports Medicine. *JAMA, 273*, 402-407.

Phongsavan, P., McLean, G., & Bauman, A. (2007). Gender differences in influences of perceived environmental and psychosocial correlates on recommended level of physical activity among New Zealanders. *Psychology of Sport and Exercise, 8*, 939-950.

Pohjonen, T., & Ranta, R. (2001). Effects of worksite physical exercise intervention on physical fitness, perceived health status, and work ability among home care workers: five-year follow-up. *Preventive Medicine, 32*(6), 465-475.

Price, G., Mackay, S., & Swinburn, B. (2000). The Heartbeat Challenge programme: promoting healthy changes in New Zealand workplaces. *Health Promotion International, 15*(1), 49-55.

Prince, S., Adamo, K., Hamel, M., Hardt, J., Gorber, S., & Tremblay, M. (2008). A comparison of direct versus self-report measures for assessing physical activity in adults: a systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 5*(1), 56.

Proper, K. I., Koning, M., van der Beek, A. J., Hildebrandt, V. H., Bosscher, R. J., & van Mechelen, W. (2003). The Effectiveness of Worksite Physical Activity Programs on Physical Activity, Physical Fitness, and Health. *Clinical Journal of Sport Medicine, 13*(2), 106-117.

Rhoades, L., & Eisenberger, R. (2002). Perceived organizational support: A review of the literature. *Journal of Applied Psychology, 87*(4), 698-714.

Sallis, J., Hovell, M., Hofstetter, C., Elder, J., Hackley, M., Caspersen, C. (1990). Distance between homes and exercise facilities related to frequency of exercise among San Diego residents. *Public Health Report* (pp. 179-185).

Saris et al. (2003). Physical activity and unhealthy weight gain. *The International Association for the Study of Obesity*, 101-114.

Saris, W. H. M., Blair, S. N., Van Baak, M. A., Eaton, S. B., Davies, P. S. W., Di Pietro, L. (2003). How much physical activity is enough to prevent unhealthy weight gain? Outcome of the IASO 1st Stock Conference and consensus statement. *Obesity Reviews, 4*(2), 101-114.

Schofield, G., Badlands, H., & Oliver, M. (2005). Objectively-measured physical activity in New Zealand workers. *Journal of Science and Medicine in Sport, 8*(2), 143-151.

Shephard, R. J. (1996). Worksite fitness and exercise programs: A review of methodology and health impact. *American Journal of Health Promotion, 10*, 436-452.

Sonstroem, R., & Morgan, W. (1989). Exercise and self-esteem: rationale and model *Medicine and science in sports : official journal of the American College of Sports Medicine 21*, 329.

SPARC. (2003). Results of the New Zealand Sport and Physical Activity surveys (1997-2001). *Sport and Recreation New Zealand*.

SPARC. (2003a). Obstacles to Action: A Study of New Zealanders' Physical Activity and Nutrition, Overview Report. Wellington: SPARC.

SPARC. (2003b). Obstacles to action: A Study of New Zealanders' Physical Activity and Nutrition. Technical Report. Wellington: SPARC.

Spence, J. C., & Lee, R. E. (2000). Toward a comprehensive model of physical activity. *Psychology of Sport and Exercise, 4*, 7-24.

Sport Canterbury. (2007). 2007 Sea 2 Sea Evaluation Report Christchurch.

Stahl, T., Rutten, A., Nutbeam, D., Bauman, A., Kannas, L., Abel, T. (2001). The importance of the social environment for physically active lifestyle - results form an international study. *Social Science and Medicine, 52*, 1-10.

Ståhl, T., Rütten, A., Nutbeam, D., Bauman, A., Kannas, L., Abel, T. (2001). The importance of the social environment for physically active lifestyle—results from an international study. *Social Science & Medicine, 52*(1), 1-10.

Stamatakis, E., Ekelund, U., & Wareham, N. J. (2007). Temporal trends in physical activity in England: The Health Survey for England 1991 to 2004. *Preventive Medicine, 45*(6), 416-423.

Statistics New Zealand. (2010), from www.stats.govt.nz

Steele, R., & Mummery, K. (2003). Occupational physical activity across occupational categories. *J Sci Med Sport, 6*, 398 - 407.

Stephenson, J., Bauman, A., Armstrong, & Bellow, B. (2000). The Cost of Illness Attributable to Physical Inactivity in Austlralia - a Preliminary Study. *CDHAC*.

Taylor, W. (2005). Transforming Work Breaks to Promote Health. *American Journal of Preventive Medicine, 29*(5), 461-465.

Thogersen-Ntoumani, C., Kenneth, R., & Ntoumanis, N. (2005). Relationships between exercise and three components of mental well-being in corporate employees. *Psychology of Sport and Exercise, 6*, 609-627.

Thomas, M. M., Hodge, W., & Smith, B. J. (2009). Building capacity in local government for integrated planning to increase physical activity: evaluation of the VicHealth MetroACTIVE program. *Health Promotion International, 24*(4), 353-361.

Titze, S., Martin, B., Seiler, R., Stronegger, W., & Marti, B. (2001). Effects of a lifestyle physical activity intervention on stages of change and energy expenditure in sedentary employees. *Psychology of Sport and Exercise, 2*, 103-116.

Tudor-Locke, C. E., & Myers, A. M. (2001). Challenges and opportunities for measuring physical activity in sedentary adults. *Sports Med, 31*, 91 - 100.

United States Department of Health and Human Services. (1996). Physical activity and Health. A Report of The Surgeon General: USDHSS, Centres for Disease Control and Prevention, National Centre for Chronic Disease Prevention and Health Promotion.

US Dept of Health and Human Services. (1996). Physical Activity and Health: Report of the Surgeon General *US Dept of Health and Human Services, Centres of Disease Control and Prevention, National Centre for Chronic Disease Prevention and Health Promotion*.

Warburton, D., Nicol, C., & Bredin, S. (2006). Health benefits of physical activity: the evidence. [Health]. *Canadian Medical Association Journal, 174*(6), 801-809.

Wen, M., Hawkley, L. C., & Cacioppo, J. T. (2006). Objective and perceived neighbourhood environment, individual SES and psychosocial factors, and self-rated health: An analysis of older adults in Cook County, Illinois. *Social Science & Medicine, 63*(10), 2575-2590.

Wenn, L., Orr, N., Bindon, J., & Rissel, C. (2005). Promoting active transport in a workplace setting: evaluation of a pilot study in Australia. *Health Promotion International, 20*(2), 123-133.

Wikipedia. (2010), from www.wikipedia.org

Wiseman, M. (2008). The Second World Cancer Research Fund/American Institute for Cancer Research Expert Report. Food, Nutrition, Physical Activity, and the Prevention of Cancer: A Global Perspective. *Proceedings of the Nutrition Society, 67*(03), 253-256. doi: doi:10.1017/S002966510800712X.

Woodcock, J., Franco, O., & Orsini, N. R., I. (2010). Non-vigorous physical activity and all-cause mortality: systematic review and meta-analysis of cohort studies. *International Journal of Epidemology*, 1-18.

World Health Organisation. (1986). Ottawa Charter for Health Promotion: First International Conference on Health Promotion, from http://www.who.int/healthpromotion/conferences/previous/ottawa/en/

World Health Organisation. (1997). Obesity: preventing and managing the global epidemic.

World Health Organisation. (2004a). Global Strategy on Diet, Physical Activity and Health Retrieved 1June, 2010, from http://www.who.int/dietphysicalactivity/strategy/eb11344/en/index.html

World Health Organisation. (2004b). Global strategy on Diet, Physical Activity and Health. Geneva: World Health Organisation.

World Health Organisation. (2010). Glossary of Terms Retrieved 1June, 2010, from http://www.who.int/hia/about/glos/en/.

Yancey, A., McCarthy, W., Taylor, W., Merlo, A., Weber, M., & Fielding, J. (2004). The Los Angeles Lift Off: a socio-cultural environmental change intervention to integrate physical activity into the workplace. *Preventive Medicine 38*, 848– 856.

APPENDICES

APPENDIX A ETHICS, QUESTIONNAIRE AND PHYSICAL ACTIVITY CHART

Ref: HEC 2008/77

7 July 2008

Ms Kerren Flanagan
Health Sciences Centre
UNIVERSITY OF CANTERBURY

Dear Kerren

The Human Ethics Committee advises that your research proposal "A workplace initiative to promote physical activity" has been considered and approved.

Please note that this approval is subject to the incorporation of the amendments you have provided in your email of 4 July 2008.

Best wishes for your project.

Yours sincerely

Dr Michael Grimshaw
Chair, Human Ethics Committee

Health Sciences Centre

SEA 2 SEA CHALLENGE QUESTIONNAIRE– CAN YOU HELP US?

Health Sciences Centre
Associate Prof Ray Kirk
Director
Tel: +64 3 364 2987, Fax: + 64 3 364 2490
Email: healthsciences@canterbury.ac.nz

7 July 2008

Dear Sea 2 Sea Workplace Coordinator,

In 2007 your workplace participated in Sea 2 Sea, a workplace physical activity initiative run by Sport Canterbury. With the support of Sport Canterbury, I am looking at the delivery and success of Sea 2 Sea, as a University of Canterbury Master of Health Sciences thesis on workplace physical activity.
Part of this study involves collecting data via a questionnaire to the workplace coordinators. The survey should take 10-15 minutes to complete. If you could find the time to complete and return the questionnaire this would be greatly appreciated, and will provide very useful feedback to Sport Canterbury for the planning of future Sea 2 Sea challenges. We will send you a summary of findings from the project.

The project has been approved by the University of Canterbury Human Ethics Committee. All information you provide will be kept anonymous and confidential, a coding system will be used to protect identities. Completion of the questionnaire indicates your consent to contribute to this study. It is anticipated the dissemination of the results of this study will be published in a Masters Thesis, refereed journal, press release and in a presentation to Sport Canterbury and other health professionals.

We look forward to receiving your questionnaire, which should be sent to me at the University's Health Sciences Centre. Enclosed with the questionnaire is a self-addressed envelope.
If you have any queries, please feel free to contact me, Kerren Flanagan, Masters student, work phone: 03 364 2987 extension 8362 or at home: 981 9126.
Email kbf18@student.canterbury.ac.nz.

or one of my supervisors at the University of Canterbury Health Sciences Centre.
Supervisors: Associate Professor Dr Ray Kirk, ray.kirk@canterbury.ac.nz, work phone: 364 3108
Professor Andrew Hornblow, andrew.hornblow@canterbury.ac.nz, work phone: 364 2987 ext 7628.

Thank you very much for assisting me in this study and helping make Sea 2 Sea the best Physical Activity Challenge in Canterbury.

Yours sincerely

Kerren Flanagan

SEA 2 SEA 2007: WORKPLACE COORDINATORS QUESTIONNAIRE

This questionnaire has two sections:

Section A: Questions about yourself as Sea 2 Sea Workplace Coordinator

Section B: Questions about your workplace.

SECTION A – ABOUT YOURSELF

1.Name of Workplace: _____

2.Title of co-ordinator's position in Workplace:_____

3. Gender: (please tick) □ Female □ Male

4. Age: (please circle)

1	2	3	4	5
less than 25 years	25-39 years	40-54 years	55-69 years	70 years or more

5. When you are at work, which one of the following best describes what you do?

□ mostly sit
□ mostly stand
□ mostly walk or perform light labour
□ mostly do heavy labour or physically demanding work
□ not applicable
□ don't know

SECTION B – ABOUT YOUR WORKPLACE

1. Sea 2 Sea has been running since 2004, what year has your workplace participated in the Sea 2 Sea challenge? (tick all that apply)

□ 2004 □ 2005 □ 2006 □ 2007

2. For Sea 2 Sea 2007 did the following occur? (tick all that apply)

□ new participants signed up for the challenge
□ the same participants signed up again
□ non physically active participants signed up
□ only those currently physically active signed up
□ it was easier to recruit participants for the challenge in 2007
□ it was harder to recruit participants for the challenge
□ don't know

3. Why did you become the workplace coordinator? (tick all that apply)

- □ I received the letter to be the Workplace Coordinator from Sport Canterbury
- □ I wanted to increase staff morale in my workplace
- □ I like motivating people to do physical activity
- □ I was the workplace coordinator for Sea 2 Sea the previous year
- □ My Supervisor/Manager asked me to
- □ don't know

4. How were participants recruited? (tick all that apply)

- □ through an email
- □ through word of mouth
- □ a sign up sheet in the staff room
- □ don't know
- □ other (please specify) _____

5. Did you do any of the following during the Sea 2 Sea Challenge? (tick all that apply)

- □ forward the weekly Sea 2 Sea motivational email from Sport Canterbury
- □ put the Sea 2 Sea wall chart up in a visible place
- □ place the Sea 2 Sea stair prompts in or near any lifts/stairs
- □ recruit participants to take up the challenge
- □ encourage employees to arrange regular physical activities throughout the challenge. For example soccer, golf, walks
- □ Look at the Sea 2 Sea website for physical activity ideas
- □ don't know
- □ other (please specify) _____

6. Approximately how much time did you spend as workplace co-ordinator during the Sea 2 Sea Challenge (24th September – 2 November)?

- □ less than 5mins a day
- □ 5-10 mins a day
- □ more than 10 mins a day
- □ none at all
- □ don't know

7. Did your workplace provide any of the following during the Sea 2 Sea Challenge? (tick all that apply)

- □ encouragement to undertake at least some physical activity
- □ encouragement to do 30mins a day of physical activity on five days or more each week
- □ promote a team spirit to encourage each-other in the challenge
- □ don't know
- □ other (please specify) _____

8. Why did your workplace sign up for Sea 2 Sea? (tick all that apply)

- □ to encourage employees to be physically active
- □ to increase team-spirit between employees
- □ to complete a challenge
- □ to have a chance at winning a spot prize
- □ it seemed worthwhile
- □ it seemed achievable/attainable
- □ to boost physical activity levels
- □ don't know
- □ other (please specify) _____

9. On a scale of zero to ten, zero being almost impossible and ten being very easy, how did you find the process of recruiting participants for the Sea 2 Sea Challenge? (please circle the number that applies)

0 1 2 3 4 5 6 7 8 9 10
(almost impossible) (very easy)

10. What do you consider the impact/outcome of Sea 2 Sea on your workplace? (tick all that apply)

- □ none at all
- □ small differences
- □ high staff morale
- □ increase in energy levels and productivity
- □ increased self-esteem amongst employees
- □ higher team spirit than before
- □ more staff participating in physical activity
- □ more support and encouragement towards physical activity from the workplace
- □ don't know
- □ other (please specify) _____

11. Are any physical activities organised through your workplace as part of the Sea 2 Sea Challenge continuing now? Please specify.

_____

_____

12. Was the weekly Sea 2 Sea motivational email helpful?

□Yes □No □Don't know

13. Were the Sea 2 Sea posters and wall chart motivating?

□Yes □No □Don't know

14. Did the stair prompts encourage employees to take the stairs instead of the lift?

□Yes □No □Don't know

15. Will your workplace continue to participate in Sea 2 Sea Challenge?

□Yes □No □Don't know

16. How could Sea 2 Sea be better tailored to the needs of your workplace? (tick all that apply)

□ more communication besides the weekly motivational emails.
□ workplace presentations by Sport Canterbury
□ more advertisements/posters to workplace
□ receiving the weekly Sea 2 Sea motivational email was enough
□ sufficient information/ was given to meet the needs of our workplace
□ don't know
□ other (please specify) _____

17. To what category or sector does your workplace belong?

□ health care (eg.general practice, hospital, health centre)
□ education (eg. schools, universities, language schools)
□ government department (eg. Christchurch City Council)
□ finance (eg. banks, insurance company)
□ manufacturing (eg. industry, electronics)
□ don't know
□ other (please specify) _____

18. Where is your workplace located? (tick all that apply)

□ near a shopping mall
□ near a park
□ near a sporting complex
□ in the city
□ in an industrial area
□ don't know

19. Does your workplace do any of the following? (tick all that apply)

□ organise sports teams
□ organise physical activities
□ promote physical activity
□ promote health and well-being
□ don't know
□ other (please specify) _____

20. Does your workplace provide any of the following? (tick all that apply)

- □ discounted gym membership at a gym/health club
- □ magazines/articles relating to physical activity/well-being
- □ encouragement to do physical activity and live a healthy life
- □ flexible working hours to juggle family commitments/important events
- □ leave to attend sporting events eg representing NZ in your chosen sport
- □ financial support and encouragement for workplace physical activity initiatives eg Corporate Challenge.
- □ senior management and/or Human Resource support for Sea 2 Sea
- □ don't know
- □ other (please specify) _____

21. Any other comments?

_____

_____

_____

Thank you for completing this questionnaire. Your responses will provide valuable feedback and assist with the planning of future Sea 2 Sea Challenges.

Self-report physical activity chart

APPENDIX B PROMOTIONAL MATERIAL FOR THE SEA 2 SEA CHALLENGE

A poster depicting people undertaking physical activity while walking the dog

APPENDIX C ADDITIONAL RESULTS

Table 15 Options showing support by the workplace coordinator

Number of support options (1-13)	Options listed in the workplace coordinator questionnaire
1	I wanted to increase staff morale in my workplace.
2	I like motivating people to do physical activity.
3	Forward the weekly Sea 2 Sea motivational email from Sport Canterbury.
4	Put the Sea 2 Sea wall chart up in a visible place.
5	Encourage employees to arrange regular physical activities throughout the challenge.
6	Look at the Sea 2 Sea website for physical activity ideas.
7	To encourage employees to be physically active.
8	To increase team-spirit between employees.
9	To complete a challenge.
10	To have a chance at winning a spot prize.
11	It seemed worthwhile.
12	It seemed achievable/attainable.
13	To boost physical activity levels.

Table 16 Frequency table: extent of support by workplace coordinator

Number of support options selected by workplace coordinator	Number of workplace coordinators (n)	Percentage of workplace coordinators (%)
2	1	1.9
3	4	7.4
4	5	9.3
5	4	7.4
6	7	13.0
7	8	14.8
8	5	9.3
9	10	18.5
10	3	5.6
11	1	1.9
12	4	7.4
13	2	3.7
Total	54	100

Table 17 Level of difficulty for recruiting participants by workplace coordinator

Level of difficulty on a scale 0-10	Number of workplace coordinators	Percent of workplace coordinators
0 = (almost impossible)	0	0.0
1	1	1.9
2	2	3.8
3	3	5.7
4	3	5.7
5	8	15.1
6	8	15.1
7	10	18.9
8	14	26.4
9	1	1.9
10 = (very easy)	3	5.7
Total	54	100

Table 18 Post hoc test (bonferroni): participation rate by workplace size

Category of workplace		Mean difference	Std. error	Sig.	95% Confidence interval	
					Lower bound	Upper bound
1 <20 Employees	2	20.277	8.941	.166	-4.29	44.84
	3	27.560	10.146	.054	-.31	55.44
	4	33.781*	11.841	.038	1.25	66.31
2 20 – 50 Employees	1	-20.277	8.941	.166	-44.84	4.29
	3	7.283	10.363	1.000	-21.19	35.75
	4	13.504	12.027	1.000	-19.54	46.55
3 51 – 100 Employees	1	-27.560	10.146	.054	-55.44	.31
	2	-7.283	10.363	1.000	-35.75	21.19
	4	6.221	12.948	1.000	-29.35	41.79
4 >100 Employees	1	-33.781*	11.841	.038	-66.31	-1.25
	2	-13.504	12.027	1.000	-46.55	19.54
	3	-6.221	12.948	1.000	-41.79	29.35

Note. * The mean difference is significant at the 0.05 level.

Table 19 Total variance explained for interpretation of workplace themes

	Initial eigenvalues			Extraction sums of squared loadings			Rotation sums of squared loadings		
Component	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.011	14.339	14.339	3.011	14.339	14.339	2.457	11.700	11.700
2	2.934	13.969	28.309	2.934	13.969	28.309	2.336	11.122	22.823
3	2.183	10.397	38.705	2.183	10.397	38.705	2.212	10.534	33.357
4	2.096	9.981	48.687	2.096	9.981	48.687	2.183	10.394	43.751
5	1.597	7.603	56.289	1.597	7.603	56.289	1.976	9.412	53.162
6	1.409	6.711	63.001	1.409	6.711	63.001	1.704	8.115	61.277
7	1.002	4.773	67.774	1.002	4.773	67.774	1.364	6.497	67.774
8	.934	4.450	72.224						
9	.886	4.218	76.442						
10	.814	3.876	80.318						
11	.730	3.474	83.792						
12	.648	3.085	86.877						
13	.594	2.831	89.707						
14	.485	2.310	92.018						
15	.397	1.890	93.908						
16	.316	1.505	95.412						
17	.286	1.360	96.772						
18	.226	1.075	97.847						
19	.209	.995	98.843						
20	.151	.718	99.560						
21	.092	.440	100.000						

Note. Extraction Method: Principal Component Analysis. The six factor solution would explain 63.0% of the variance in data.

Figure 6 Scree plot identifying common themes in workplace support